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SunSet xDSL

MRD-10000-001

REV: A

Marketing Requirements Document

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Revision: A

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Approved: PMC _____ Mktg Mgmt _____ Proj Engr _____ Engr Mgmt _____

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1.0 Summary

The SunSet xDSL is the only field test set which can properly qualify copper lines for xDSL transmission. It earns this distinction because it is the only test set which tests copper lines using the actual DSL line codes and because it is the only set with advanced spread spectrum signal-to-noise tests. Primary benefactors are the first, second, and third level technicians of DSL providers, such as RBOC and CLECs, responsible for the installation, maintenance, and repair of DSL services. At maturity, the projected sales are 500 units/year generating revenues of $2 million/year.

2.0 Change History

Rev	Date	By	Appr	Description
A	02/27/98	SK		Phase 1 Approval signoff

3.0 Reference Documents

- ANSI T1.413-1995: Network and Customer Installation Interfaces- ADSL Metallic Interface
- Bellcore TA-NWT-001210: Generic Requirements for High-Bit-Rate Digital Subscriber Lines
- ADSL FORUM TR-001: ADSL Forum System Reference Model [1997]
- ADSL FORUM TR-002: ATM over ADSL Recommendations [Mar 1997]
- MD 6100-1: HDSL Loop Back Methods
- Alcatel ADSL DynaMiTe: "Modem Control Interface (CTRLE) Specification" [V1.0, Oct 1997]
- Alcatel MTK-20131: "DynaMITE Rate Adaptive Asymmetrical Digital Subscriber Line Modem Chipset" [Rev. 1.0, Oct 1997]
- Alcatel MTC-20136: "ADSL Transceiver Controller" [Rev. 1.0, Nov 1997]
- Alcatel MTC-20135: "ADSL DMT Transceiver with ATM Framer" [Rev. 1.0, Aug 1997]
- Alcatel MTC-20134: "Integrated ADSL CMOS Analog Front-End Circuit" [Rev. 1.0, Aug 1997]
- PairGain OEM-HMO-SP2-03: Mini OEM Modules
- PairGain OEM-HMO-SW2-01: Mini OEM Modules ASCII Text Interface
- PairGain OEM-HMO-SW2-01: Mini OEM Modules Host Management Interface
- Bellcore GR-1089-CORE: Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment [Issue 1, Nov 1994]
- ANSI/IEEE Std 743-1995: IEEE Standard Methods and Equipment for Measuring the Transmission Characteristics of Analog Voice Frequency Circuits

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4.0 Applications

4.1 DMM and TDR Measurements
An xDSL tester is connected to the Cu pair under test using Bantam to 2-probe clip cable. DMM and TDR are used to locate cable faults, such as presence of loading coils, bridge taps, water in the cable, shorts, etc.

Pair Under Test
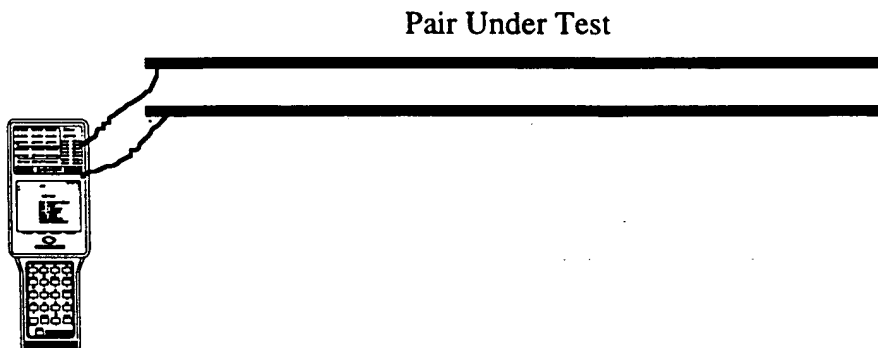
4.2 Line Measurements: Insertion Loss, Background Noise, Signal to Noise, Loop Resistance
These measurements are used to characterize transmission capabilities of the line and determine if the pair is fit for xDSL transmission at a range of 10 kHz to 1.5 Mhz. Two sets are required: Master Unit conducts measurements; Slave Unit generates required tones and properly sets up the far end.
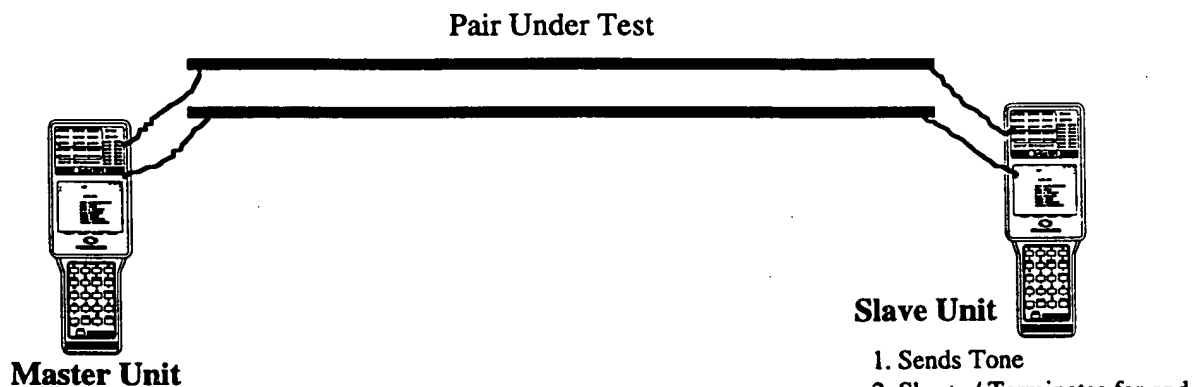
Pair Under Test

Slave Unit

1. Sends Tone
2. Shorts / Terminates far end

Master Unit

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4.3 HDSL
4.3.1 Dual HTU-C and HTU-R Emulation: The ultimate HDSL Loop Qualification Method

HDSL Loop 1

HDSL Loop 2

HTU-C   **HTU-R**
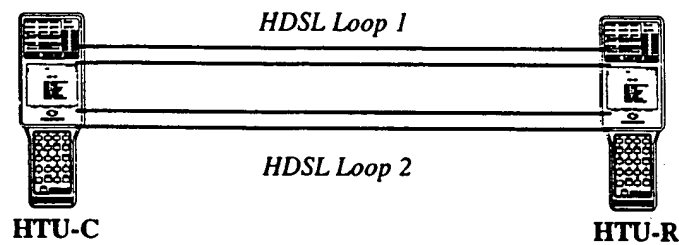
4.3.2 In-Service HTU-C or HTU-R Function

East

E1/T1   *HDSL Loop 1*   *E1/T1*

HDSL Loop 2

HTU-C   **HTU-R**   **NIU**
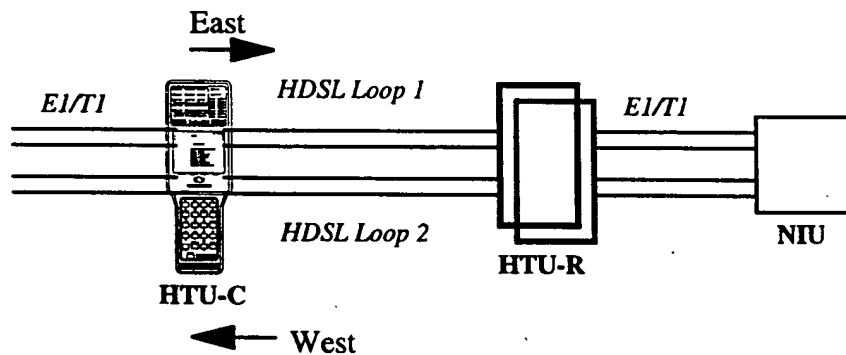
West

- In-Service BERT east or west
- Respond to loopback commands
- Report Modem Status
- In-Service HTU monitoring measurements
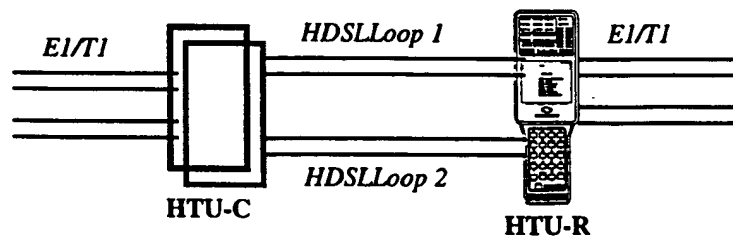
E1/T1   *HDSLLoop 1*   *E1/T1*

HTU-C   *HDSLLoop 2*

HTU-R

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4.3.2 HDSL: Out of Service HTU-C & HTU-R Function

- BERT T1
- HTU/T1 loopback
- Modem Status
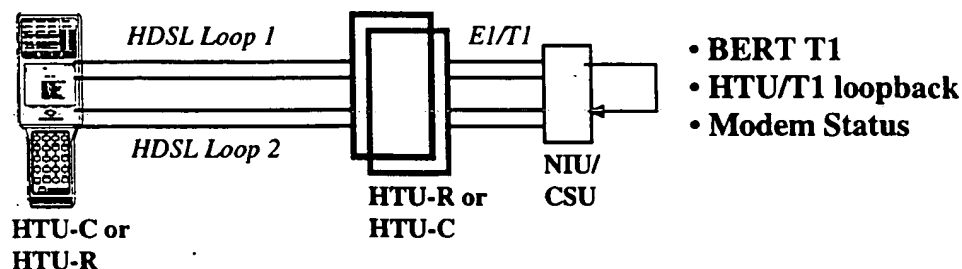
4.3.3 T1 and E1 testing on HDSL span:

- BERT at DSX-1 and NIU/CSU access points.
- NIU/CSU loopback testing from DSX-1
- Sa bit loopback testing for E1 systems.

- E1/T1 End to End BERT

- E1/T1/HTU Loopback Control
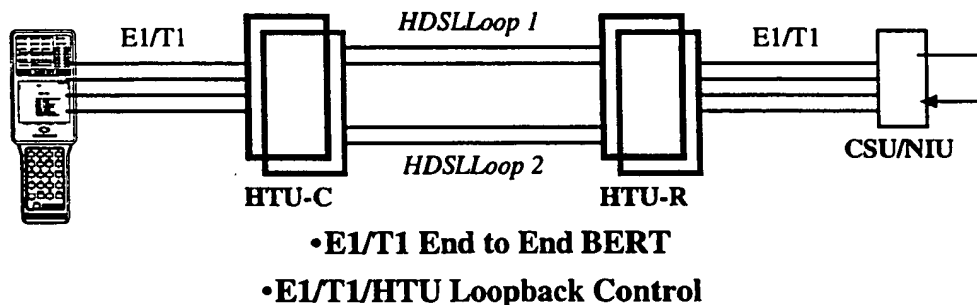
4.4 ADSL:
4.4.1 Simultaneous ATU-C and ATU-R Emulation: Ultimate Method of ADSL Loop Qualification

4.4.2 ATU-R or ATU-C Function

CENTRAL OFFICE

ATU-C

SPLITTER CUSTOMER PREMISES

ATU-C

ATU-C

ATU-C

ATU-R

SPLITTER CUSTOMER PREMISES

CENTRAL OFFICE

ATU-R

ATU-C
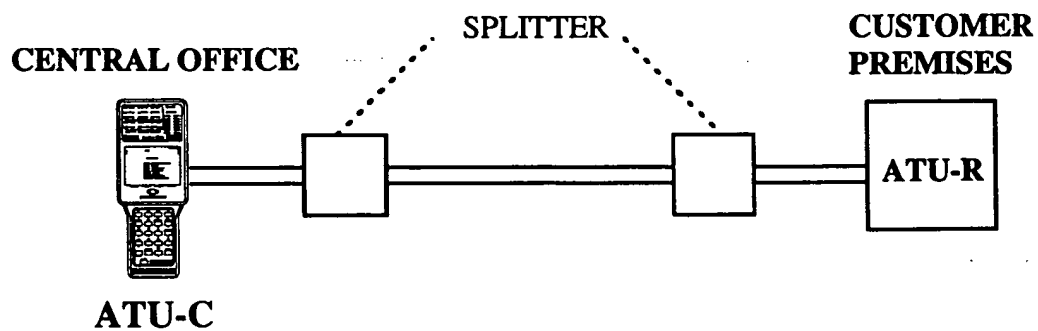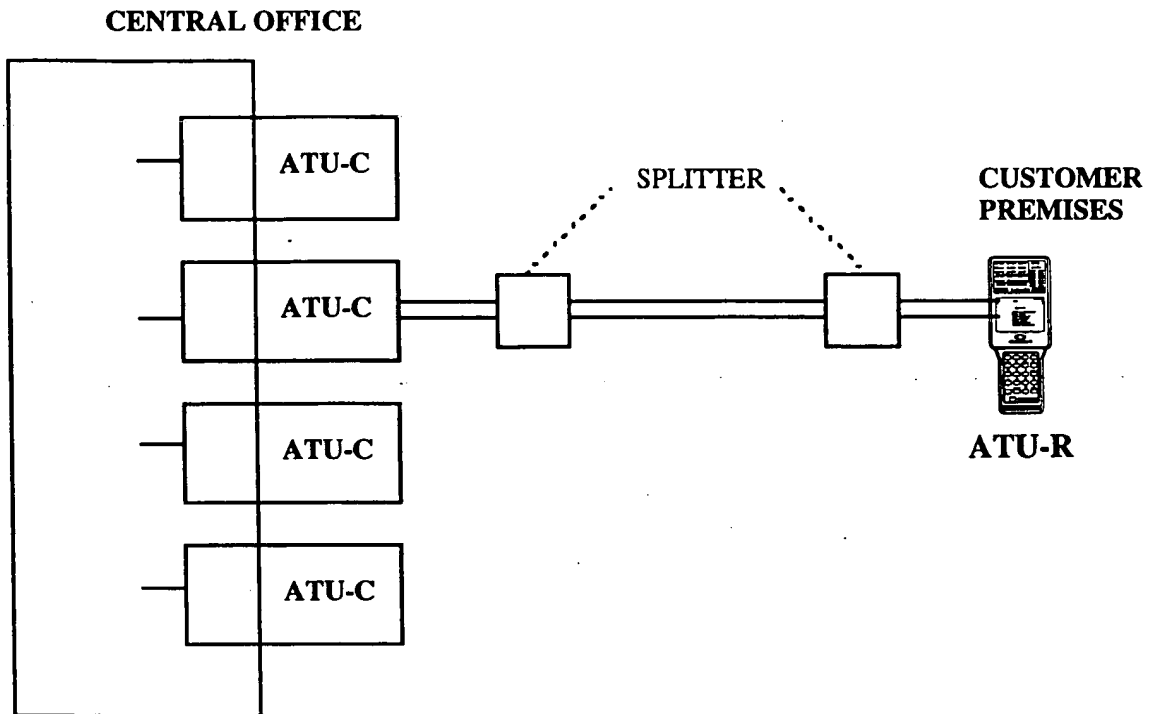
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5.0 Functions
5.1 Layer 1 Functions:
5.1.1 Digital Multimeter

- Meters:
  - Volt DC and AC
    - Detect and Measure foreign voltages; span voltage
  - Ohm Meter

    - Span's resistance should be > 5 MΩ between tip/ground and ring/ground
  - Capacitance
- Loop Resistance (requires two sets)
  - measures that span has continuity between CO and Customer Premises
  - determines that no physical faults exist (grounds, shorts, opens)
  - HDSL requirement: 900 Ω
  - ADSL requirement: 1300 Ω

5.1.2 Time Domain Reflectometer

- Detect the following based on polarity of reflected pulse:
  - Cable length
  - Load Coils
  - Bridge Taps
  - Water

5.1.3 Load Coil Detector

- Detect presence of loading coils based on Impedance vs. Frequency Plot *[Need details from R&D]*

5.1.4 Insertion Loss Measurement for DMT and fundamental frequencies of interfering services.

- Measure attenuation using two sets: Slave Unit sends tone from far end. Master unit conducts measurements.

- Measure DMT 256 frequencies, 40 kHz (ISDN U interface), 82 kHz (DDS), 96 kHz (ISDN S-Interface), 196 kHz (HDSL 2-Pair T1), 260 kHz (HDSL E1), 392 kHz (HDSL 1-Pair T1) 772 kHz (T1) 1.024 MHz (E1), or User Selectable range and step size

5.1.5 Background Noise in 10 kHz to 1.5 MHz spectrum

- Slave Unit terminates the far end

- Master unit performs measurement.

- Applicable filters (per IEEE Std 743-1995 Clause 9)

- E-Filter
  - Filter Section: High pass 3 dB down 1 kHz ; Low pass 3 dB down 50 kHz
  - For ISDN BRA DSL at an impedance of 135 Ω

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- F-Filter
  - Filter Section: High pass 3 dB down: 5 kHz ; Low pass 3 dB down: 245 kHz
  - For HDSL at an impedance of 135 Ω
- G-Filter
  - Filter Section: High pass 3 dB down: 20 kHz ; Low pass 3 dB down: 1.1 MHz
  - For ADSL at an impedance of 100 Ω

5.1.6 Signal to Noise Ratio Measurement

- Measure DMT 256 frequencies, 40 kHz (ISDN U interface), 82 kHz (DDS), 96 kHz (ISDN S-Interface), 196 kHz (HDSL 2-Pair T1), 260 kHz (HDSL E1), 392 kHz (HDSL 1-Pair T1), 772 kHz (T1), 1.024 MHz (E1), or User Selectable range and step size
- Slave unit sends tone from far end, Master unit performs measurement

5.1.7 T1 Testing
- T1 BERT in HTU-C or HTU-R mode
- T1 BERT from T1 access point
- Loopback Control of HTU-C & R, CSU/NIU
- VF channel monitor from HTU-C, HTU-R, or T1 access point

5.1.8 E1 Testing
- E1 BERT in HTU-C or HTU-R mode
- E1 BERT from E1 access point
- Loopback Control of HTU-C & R; Sa Bit Loopback Control
- VF channel monitor from HTU-C, HTU-R, or E1 access point

5.2 Layer 2 Functions:
5.2.1 ADSL
- ATU-R Emulation
- ATU-C Emulation
5.2.2 HDSL
- HTU-R Emulation
- HTU-C Emulation
- HTU-C Loop Back: A regenerative loop back of the DSX-1 signal toward the network *(per MD 6100-1 document)*
- HTU-R Loop Back: A regenerative loop back of the DS1 signal toward the network *(per MD 6100-1 document)*

5.3 Layer 3 Functions:
5.3.1 *IP Ping Test (possible)*
- Engineering to research and determine feasibility; Report on available alternatives.

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6.0 Specifications

6.1 TDR

Pulse widths:
20 nS to 5 µS

Test Signal:
1/2 Square Wave if Pulse width < 1 µS
1/2 Sine Wave if Pulse width > 1µS

Amplitude:
5 V_{p-p} into 100 Ω, 10 V into open circuit

Output Impedance:
100 Ω

Velocity of Propagation:
0.4 to 0.99 in 0.01 increments

Maximum Measurable Attenuation:
Less than -80 dB (roundtrip) of 5 V [12,000 ft @ 26 AWG returned signal]

Distance Range: Dependent on cable type and condition
10 ft to 22000 ft @ 22 AWG
10 ft to 18000 ft @ 24 AWG
10 ft to 12000 ft @ 26 AWG
3 m to 6700 m @ 0.6 mm
3 m to 5400 m @ 0.5 mm
3 m to 3600 m @ 0.4 mm

Distance Accuracy: (± uncertainty in V_{PEAK} and Velocity of Propagation)
± 4 ft @ 10 ft to 1000 ft   or [± 1 m @ 3 m to 300 m]
± 6 ft @ 1000 ft to 22000 ft   or [± 2 m @ 300 m to 6700 m]

6.2 INSERTION LOSS MEASUREMENT

Sine Wave Generator

Frequency Range:
10 kHz to 1.5 MHz

Frequency Resolution:
0.1 kHz

Frequency Accuracy:
± 50 ppm @ (25°C) , Temperature coefficient ± 2 ppm/°C, aging ± 10 ppm/year

Level Range:
-20 dBm to 26 dBm in 1 dBm steps

Level Accuracy (Flatness):
0.3 dB for output level > 0 dBm
0.5 dB for output level < 0 dBm

Output Impedance:
100 Ω balanced

Total Harmonic Distortion:
< -50 dB @ 10 kHz to 30 kHz
< -60 dB @ 30 kHz to 300 kHz
< -50 dB @ 300 kHz to 700 kHz
< -45 dB @ 700 kHz to 1.5 MHz

Spurious (Non-Harmonic):
< -60 dB @ 10 kHz to 1.5 MHz

Receiver:
  Measurement Method:
    FFT
  Frequency Range:
    10 kHz to 1.5 MHz
  Frequency Resolution:
    1.078 kHz
  * **Input Impedance:**
    100 Ω balanced
    * *Can this be done in high impedance? Customer desires in-service level measurements in bridge mode.*
  Level Range:
    -65 dBm to 6.9 dBm
  Level Accuracy:
    ± 0.2 dB of reading ± 0.1 dB $\times \log [0.5\, V_{RMS}^2 / V_{IN\,RMS}^2]$ @ 10 kHz to 700 kHz
    ± 0.3 dB of reading ± 0.1 dB $\times \log [0.5\, V_{RMS}^2 / V_{IN\,RMS}^2]$ @ 700 kHz to 1.5 MHz

6.3 Digital Multimeter (DMM)
  Digits:
    3 3/4
  DC Voltage Measurement:
    350 V Max
    Range:
      0.4 V, 4 V, 40 V, 400 V (Auto Range)
    Resolution:
      0.1 mV, 1 mV, 10 mV, 100 mV
    Accuracy:
      $\pm 0.35\%$ of range
    Protection:
  AC Voltage Measurement:
    275 VAC Max
    Detector: True RMS
    Range:
      4 V, 40 V, 400 V (Auto Range)
    Resolution:
      1 mV, 10 mV, 100 mV
    Accuracy:
      $\pm 0.5\%$ of range @ 50 to 500 Hz
      $\pm 2.0\%$ of range @ 500 to 1 kHz
  Resistance:
    0.1 Ω to 10 MΩ
    Range:
      400 Ω , 4 kΩ, 40 kΩ, 400 kΩ, 4 MΩ, 40 MΩ (Auto Range)
    Resolution:
      0.1 Ω, 1 Ω, 10 Ω, 100Ω, 1 kΩ, 10 kΩ
    Accuracy:
      $\pm 1\%$ of range @ 400 Ω range
      $\pm 0.5\%$ of range @ 4 kΩ to 40 kΩ range
      $\pm 1\%$ of range @ 400 kΩ range
      $\pm 3\%$ of range @ 4 MΩ range
      $\pm 3\%$ of range @ 40 MΩ range

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Capacitance:
    10 pF to 40 μF (Auto Range)
    Range:
        4 nF, 40 nF, 400 nF, 4 μF, 40 μF
    Resolution:
        1pF, 10pF, 100 pF, 1 nF, 10 nF
    Accuracy:
        ± 2% of range

6.4 xDSL Plug In Modules
6.4.1 PairGain HDSL Module
- Functional Blocks
    - PairGain HDSL module (1.5 Mbps or 2.0 Mbps)
    - E1 or T1 line interface
    - E1 or T1 line framer
    - Voice channel monitor with volume control for: Framed T1 or E1 payload in HDSL or T1/E1 line side
        - μ or A law programmable
- Test Modes
    - HTU-R or HTU-C Function
    - HDSL Payload BERT (1.544 Mbps or 2.048 Mbps full rate)
    - HDSL T1/E1 framed BERT (Full or fractional rate)
    - T1 or E1 BERT (Full or fractional rate)
    - Bit error rate tests for the following patterns:
        Repeating: 1111, 0000, 0101, 1-in-8, 3-in-24 (T1 only)
        Pseudo random: QRS, PRBS 2^n-1: n = 6, 7, 9, 11, 15, 20, 23
- HTU-R and HTU-C Loopback codes
- HTU-C Line Power Generation implemented by external power supply.
    - Per PairGain OEM-HMO-SP2-03, pages 18 and 19.
    - Per Bellcore GR-1089-CORE: Voltage cannot exceed 140 volts from earth ground and line power be isolated from earth ground so there is no more than 10 milliamps conducted from any point to earth ground.
- HTU-R acceptance of line power from HTU-C
    - Initial assessment is good. (Requires further investigation)

6.4.1.1 T1 Specifications
- Line Interface: 100 Ω, RJ-45: Bridge, Monitor, Term
- External Clock Interface: 100 Ω, RJ-45: 0 to - 36 dB, Term only
- Internal Clock Calibration: TTL, RJ-45 pin 1 & 8 (shares the Ext Clock port)
- Framing: ESF, SF, SLC-96, Unframe
- Line Code: B8ZS, AMI
- Measurements: G.821, Line Frequency, Line Level (0 to -36 dB, ± 1 dB), FBE, CRC-6, BPV, Yellow Alarm, AIS, LOS, ...
- Voice Frequency Capability : VF Monitor, View/Send ABCD Bits, Tx dmw, Tx Idle channel Code
- Tx clock: Ext, Rx, Intern (1.544 MHz, ± 150 ppm @ 1 ppm)
- Loopback Control: In-Band or FDL-ESF, CSU/NIU

6.4.1.2 E1 Specifications
- Line Interface: 120 Ω, RJ-45: Bridge, Monitor, Term
- External Clock Interface: 120 Ω, RJ-45: 0 to -41 dB, Term only
- Internal Clock Calibration: TTL, RJ-45 pin 1 & 8 (shares the Ext Clock port)
- Framing: PCM-30/CRC-4, PCM-31/CRC-4, Unframe

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- Line Code: HDB3
- Measurements: G.821, Line Frequency, Line Level (0 to -41 dB, ± 1 dB), FBE, CRC-4, Code Err, RAI, E-bit, AIS, LOS, ...
- Voice Frequency Capability: VF Monitor, View/Send ABCD Bits, Tx Idle channel code
- Tx clock: Ext, Rx, Intern (2.048 MHz, ± 150 ppm @ 1 ppm)
- Loopback Control by Sa bits
- View/Send Sa bits

6.4.2 Alcatel ADSL Module
- R3.0/3.1 chip set implementation
- ATU-R or ATU-C Function

6.4.3 Other modules to be announced

6.5 Connectors:
Base Unit: Single Bantam
PairGain Module: Three RJ-45 (HDSL, T1 or E1, Ext Clock)
Alcatel Module: Single RJ-45
Serial Port: DIN 8 to RS232C
DC power jack

6.6 Status Indicators
LEDs
18 bi-color

6.7 General
Size:
10.5 cm x 6 cm x 27 cm [4" x 2.4" x 10.5"]
Weight:
1.3 kg [2.8 lb]
Display:
32 x 16 graphic LCD with backlight
Battery:
Rechargeable, field-replaceable 9-cell NimH pack
5 hours of continuous use (nominal)
Charger:
Universal 100 - 240 VAC adapter with IEC power cable connector

6.8 Environmental
Operating Temperature:
0 °C to 50 °C [32 °F to 122 °F]
Storage Temperature:
-20 °C to 70 °C [-4 °F to 158 °F]
Humidity:
5 % to 90 % noncondensing

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6.9 Electrical Safety [per Bellcore GR-1089-CORE]

6.9.1 Voltage-Limiting Protector: 3-mil-gap carbon block
- Has upper 3-sigma limiting voltage of 1000V peak under surge conditions and 600 Vrms (800V peak) at 60 Hz.
- Equipment protected by carbon blocks can withstand voltages up to these levels.

6.9.2 Current-Limiting Protector:
- Protector should have a continuous carry-current rating of 350 mA and be applied on "the equipment side of the voltage limiting protector."

6.9.3 Fuse Links
- Consists of 24 or 26 AWG Cu cable and coordinates with the current-carrying capability of primary voltage-limiting protector.

6.9.4 AC Power Fault and Lightning
- Should comply to GR-1089-CORE Section 4.5.7, Table 4-2 "First Level Lightning Surge (Telecommunications Port)"
- Should comply to GR-1089-CORE Section 4.5.10, Table 4-5 "First Level Lightning Surge (AC Power Port)"
- Should comply to GR-1089-CORE Section 4.5.12, Table 4-7 "First Level AC Power Fault (Telecommunications Port)"

6.10 EMI Compatibility [per Bellcore GR-1089-CORE]

6.10.1 FCC Part 15, Class A: Digital Device for US; CE for Europe
6.10.2 EN55022 (radiated emissions)
6.10.3 EN55024-2 (electrostatic discharge)
6.10.4 EN55024-3 (radiated immunity)

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7.0 User Interface
7.1 Keypad and LED Layouts:

F1	F2	F3	F4
xDSL	DMM	TDR	LINE
STORE / RECALL	LIGHT	·HOLD	ERR INJ
OTHER (CONTRAST)	◄ (PRINT)	▲ (LOCAL)	►
SHIFT	ESC	▼	ENTER

PEEL TAB
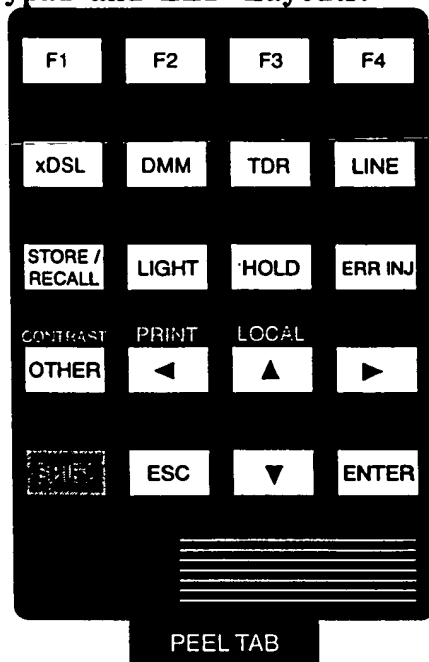
xDSL: Access HDSL, ADSL, T1, E1 functions
DMM : Access DMM and Load Coil Test
TDR: Access TDR testing
LINE: Access LINE testing
    (Insertion Loss, S/N, Background Noise,
    Loop Resistance)
STORE/RECALL: For storing and recalling results;
    1. Can be pressed at anytime
    2. Can store any results
HOLD : Freezes screen during measurement and displays
    blinking green HOLD LED
ERR INJ: Inject errors
OTHER: To access OTHER SETUP functions
    (i.e. Erase NV RAM, Date & Time, etc.)
ESC: To go to previous menu; Ultimate destination is
    first menu of function selected
PRINT: (Under investigation)
LOCAL: (Under investigation)

● xDSL	● xTU-C	● xTU-R	● POWER
● DMM/COIL	● TDR	● LINE	● BATTERY
● SIGNAL	● LP 1 SYNC	● LP 2 SYNC	
● FRAME	● AIS	● ALARM	
● BIT ERR	● CODE ERR	● ERRORS	
● HOLD	● Rx TONE	● PAT SYNC	

SunSet xDSL

xDSL: Green when User is in xDSL mode;
    Remains off otherwise
xTU-C: Green: User is in ATU-C or HTU-C mode
    Red: Link Down with xTU-R
xTU-R: Green: ATU-R or HTU-R mode
    Red: Link Down with xTU-C
DMM: Green: User is in DMM or Load Coil
    Test mode; Remains off otherwise
TDR: Green when User is in TDR mode;
    Remains off otherwise
LINE: Green when User is in LINE mode;
    Remains off otherwise
SIGNAL: General LED- Applies to Layers 1, 2, and 3
    Red: No turn up in process ; No signal
    Green : Turn up complete ; Signal
FRAME: General LED- Applies to Layer1, 2, and 3
    1. Blinks green during HDSL/ADSL turnup.
    2 Solid Green when complete
    2. Red if open, fails, or not in process.
Rx TONE: For Master Unit
    In LINE Menus- lights green when Tone is
    detected from Slave unit
AIS: Loss of signal for E1/T1 payload
BIT ERROR: Layer 1
CODE ERROR: Layer 1
HOLD: Blinks green when test set is in HOLD mode

LP 1 SYNC: HDSL only
    Green when: 1) Synch achieved for HDSL Loop1
      2) Successful Loop Up in T1/E1 Loopback Control
    Red: No synch for HDSL LP1; Loop Dn in T1/E1
      Loopback Control
LP 2 SYNC: HDSL only
    Green when: Synch achieved for HDSL Loop2
    Red: No synch for HDSL L2
ERRORS: Layer 1; Layers 2&3 (under investigation)
ALARM: Layer 1; Layer 2 (under investigation)
PAT SYNC: Layer 1&2 BERT

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7.2 Menu Tree

xDSL
    HDSL/T1/E1
        TEST CONFIGURATION
        VIEW SPAN STATUS
        VIEW PERFORMANCE DATA
        T1 OR E1 BASIC MEASUREMENTS
        LOOP BACK CONTROL
        HDSL SYSTEM SETTINGS
    ADSL
        SETUP
        MODEM STATUS
            GENERAL STATUS
            BIT GRAPHIC/TABLE
            CARRIER MASK
            CLOSE LINK
            OPEN LINK
            ATU MODULE SELF TEST
        LINK MEASUREMENTS
        PING
  DMM
    DCV
    ACV
    OHM
    CAP
    LOAD COIL DETECTOR
  TDR
  LINE
    MASTER OR SLAVE
    INSERTION LOSS
    SIGNAL TO NOISE
    BACKGROUND NOISE
    LOOP RESISTANCE
  STORE/RECALL
  OTHER
    DEFAULT SETTINGS
    TEST PARAMETERS
    GENERAL CONFIG
    ERASE NV RAM
    VERSION/OPTION

7.3 Screens

The MAIN MENU that is prevalent in current SunSets does not exist for the SunSet xDSL. Upon power up, an Introduction Screen appears for 2 to 3 seconds. Then the DMM Screen 1 will appear as the default screen (User can select another default screen in OTHER SETUP). Users can choose a different function at any time by pressing the appropriate key.

```
 123456789012345678901234567890 12
1                            12:30:55 1
2                                    2
3                                    3
4         (Sunrise Logo Here)         4
5                                    5
6                                    6
7          SunWare                   7
8          xDSL                      8
9                                    9
0                                    0
1                                    1
2                                    2
3                                    3
4                                    4
5      Version 0.00 S/N 0001         5
6      SUNRISE TELECOM, Inc. 1997    6
 123456789012345678901234567890 12
```

INTRODUCTION SCREEN
1. Appears after power up for 2-3 seconds.
2. Then DMM Screen 1 appears as default.

7.3.1 Digital Multimeter Screens

When the User pushes the DMM key, the following screen appears :

DMM 1 (Note: Auto Range, so other possible readings are:
1.000 V, 10.00 V, 100.0 V)

```
12345678901234567890123456789012
1                              12:30:55 1   1. F-KEYS:
2                                       2      DCV, ACV, OHM, CAP, COIL
3              DCV                       3
4                                        4
5                                        5
6                                        6
7                                        7
8            111.1 mV                    8
9                                        9
0                                        0
1                                        1
2                                        2
3                                        3
4                                        4
5                                        5
6   DCV      ACV      OHM      more      6
    CAP      COIL               more
```
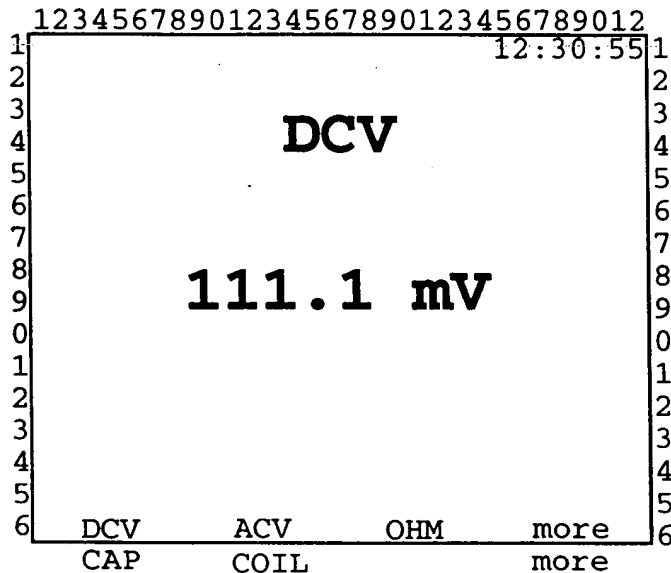
1. Pressing an F-Key for another meter will immediately change to that mode and a reading will be displayed.
2. The DMM key will lead to the last DMM screen User was in.
3. Load Coil Detector Screen will be included in next revision of MRD.

DMM 2 (Note: Auto Range, so other possible readings are:
40.00 V, 400 V)
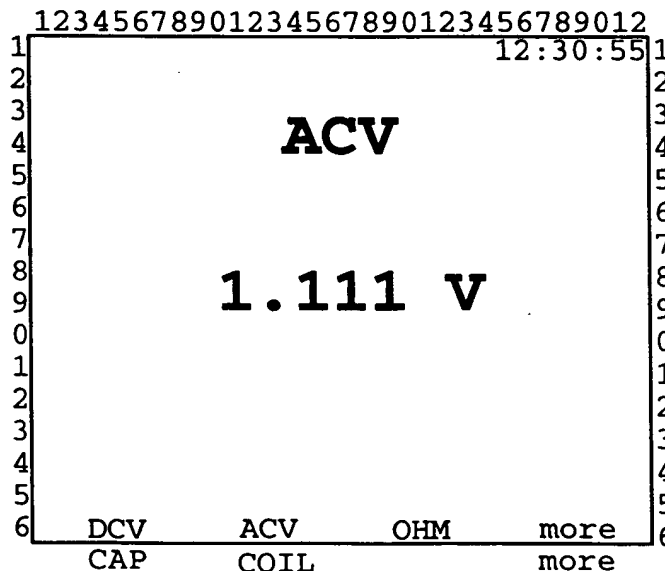
```
12345678901234567890123456789012
1                              12:30:55 1   1. F-KEYS:
2                                       2      DCV, ACV, OHM, CAP, COIL
3              ACV                       3
4                                        4
5                                        5
6                                        6
7                                        7
8            1.111 V                     8
9                                        9
0                                        0
1                                        1
2                                        2
3                                        3
4                                        4
5                                        5
6   DCV      ACV      OHM      more      6
    CAP      COIL               more
```

REV: A

DMM 3 (Note: Auto Range, so other possible readings are:
4000Ω, 40.00 kΩ, 400.0 kΩ, 4000 kΩ, 40.00 MΩ

```
   1234567890123456789 0123456789012
 1 ┌─────────────────────────12:30:55┐1    1. F-KEYS:
 2 │                                  │2       DCV, ACV, OHM,.CAP, COIL
 3 │                                  │3
 4 │            OHM                   │4
 5 │                                  │5
 6 │                                  │6
 7 │                                  │7
 8 │                                  │8
 9 │          111.1 Ω                 │9
 0 │                                  │0
 1 │                                  │1
 2 │                                  │2
 3 │                                  │3
 4 │                                  │4
 5 │                                  │5
 6 │ DCV      ACV      OHM      more  │6
   │ CAP      COIL             more   │
   └──────────────────────────────────┘
```
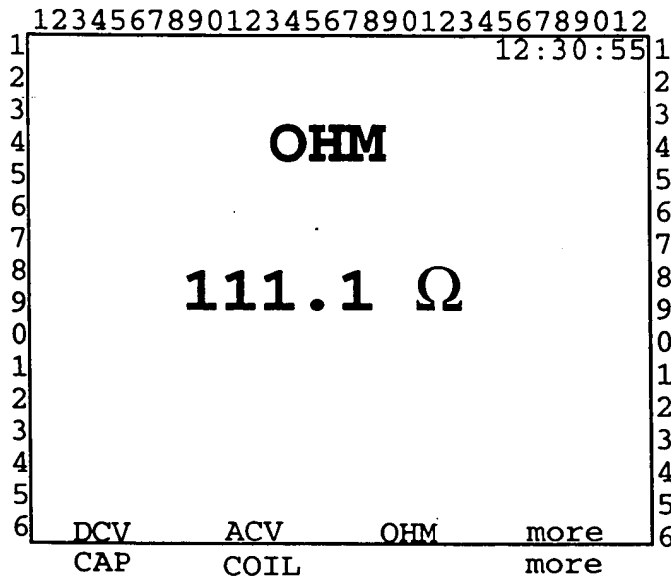
DMM 4 (Note: Auto Range, so other possible readings are:
50.00 nF, 500.0 nF, 5.000 uF, 50.00 uF
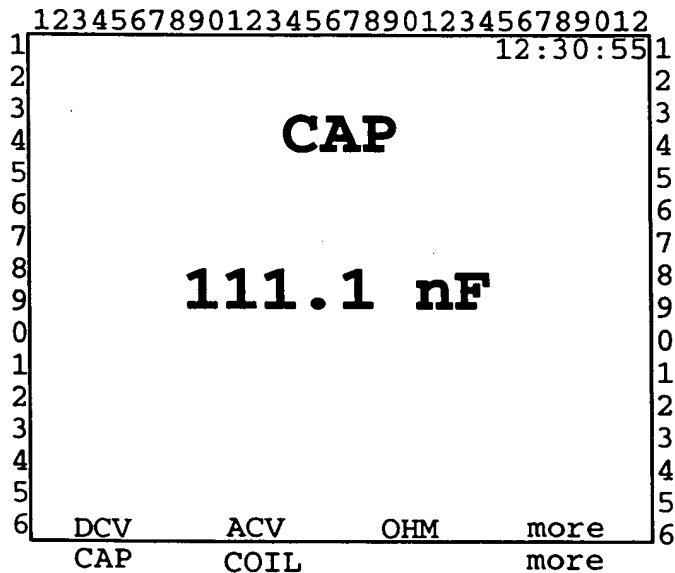
```
   1234567890123456789 0123456789012
 1 ┌─────────────────────────12:30:55┐1    1. F-KEYS:
 2 │                                  │2       DCV, ACV, OHM, CAP, COIL
 3 │            CAP                   │3
 4 │                                  │4
 5 │                                  │5
 6 │                                  │6
 7 │                                  │7
 8 │         111.1 nF                 │8
 9 │                                  │9
 0 │                                  │0
 1 │                                  │1
 2 │                                  │2
 3 │                                  │3
 4 │                                  │4
 5 │                                  │5
 6 │ DCV      ACV      OHM      more  │6
   │ CAP      COIL             more   │
   └──────────────────────────────────┘
```

7.3.2 TDR Screens

TDR 1a: English Units

```
 1234567890123456789012345678 9012
1                      12:30:55 1
2                                2
3    TIME DOMAIN REFLECTOMETER    3
4                                4
5 UNITS: ENGLISH                  5
6                                6
7     GAUGE        : 26 AWG       7
8     PROP VELOCITY: 0.60         8
9     CABLE LENGTH : 100 FT       9
0                                0
1                                1
2                                2
3     Press ENTER key to START    3
4                                4
5                                5
6                                6
 1234567890123456789012345678 9012
```

1. Line 5 display for UNIT is designated in the DEFAULT SETTINGS screen. This selections remains permanent until changed by the User (immune to NV RAM erase)

2. GAUGE
   F-keys:
   19 AWG, 22 AWG, 24 AWG, 26 AWG

3. Propagation Velocity is adjustable in .01 or .1 increments between 0.4 to 0.99.
   F-keys:
   +.01, -.01, +.1, -.1

4. Cable Length selection transmits appropriate Pulse Width (Note: Per R&D, Pulse Width cannot be adjusted in active TDR screen)
   F-keys: (Units = ft)
   +10, -10, +100, more, -100, +1000, -1000, more

5. Pressing the ENTER key sends the test signal and leads to the TDR 2 Screen.

TDR 1b: Metric Units

```
 1234567890123456789012345678 9012
1                      12:30:55 1
2                                2
3    TIME DOMAIN REFLECTOMETER    3
4                                4
5 UNITS: METRIC                   5
6                                6
7     GAUGE        : 0.4 mm       7
8     PROP VELOCITY: 0.60         8
9     CABLE LENGTH : 10 m         9
0                                0
1                                1
2                                2
3     Press ENTER key to START    3
4                                4
5                                5
6                                6
 1234567890123456789012345678 9012
```

1. GAUGE
   F-keys:
   0.4 mm, 0.6 mm, 0.8 mm

2. Propagation Velocity is adjustable in .01 or .1 increments between 0.4 to 0.99.
   F-keys:
   +.01, -.01, +.1, -.1

3. Cable Length
   F-keys: (Units = m)
   +10, -10, +100, more, -100, +1000, -1000, more

REV: A

TDR 2a: With Cursor Control

```
 12345678901234567890123456789012
1          TDR          12:30:55 1
2 DISTANCE:   [55 ft]             2
3                                 3
4                                 4
5                                 5
6                                 6
7                                 7
8                                 8
9                                 9
0                                 0
1                                 1
2 [10                      75]    2
3 MARK:    55 ft     [H:    2]    3
4 ◁▷ CURSOR          [V: 1.000]   4
5 ▲▼ GAIN            [O:    1]    5
6 ZOOM_IN  ZOOM_OUT  ALIGN  more  6
   OFFSET+   OFFSET-
   PAGE_LFT  PAGE_RHT
   MARKER
```

TDR 2b: W/ Marker Control

```
 12345678901234567890123456789012
1          TDR          12:30:55 1
2 DISTANCE:   [65 ft]             2
3                                 3
4                                 4
5                                 5
6                                 6
7                                 7
8                                 8
9                                 9
0                                 0
1                                 1
2 [10                      75]    2
3 MARK:    10 ft     [H:    2]    3
4 ◁▷ MARKER          [V: 1.000]   4
5 ▲▼ GAIN            [O:    1]    5
6 CURSOR             ALIGN  more  6
   ZOOM_IN   ZOOM_OUT
   OFFSET+   OFFSET-
   PAGE_LFT  PAGE_RHT
```

1. The ENTER key from the previous screen leads to this screen. The reflection is shown immediately.
2. ESC Key leads to TDR 1 screen
3. Active TDR screen is 64 pixels by 184 pixels.

User Control:

1. *Tracking Cursor* controlled by the Right and Left arrow keys. Shown in Line 14 < > Cursor.
   a. Distance display is shown in Line 2 corresponding to the cursor position (in reverse video).
   b. Horizontal scale is shown on Line 12.
2. *Vertical Gain* is adjustable with Up and Down arrow keys.
   Scale: 0.125, 0.25, 0.5, 1, 2, 4, 8, 16, 32 vertical units;
      Display is 1 pixel per chosen veritcal units.
   Gain Scale is shown in Line 14.
3. *Horizontal Zoom* is adjustable by F-keys **ZOOM_IN** and **ZOOM_OUT**:
   Scale: 1, 2, 4, 8, 16, 32, 64, 128, 256 ns
      Display is 1 pixel per chosen ns
   Zoom Scale is shown in Line 13.
4. Vertical Local Offset is adjustable by F-Keys **OFFSET+** and **OFFSET-**
   Scale: +/- 256 by increments of 2.
   Offset is shown in Line 15.
   Note: When user takes the cursor to the center of a reflected pulse that goes out of vertical screen range, then an automatic offset adjustment is made to bring pulse within screen parameters.
5. **PAGE_LFT** and **PAGE_RHT** F-Keys moves screen by 1/2 page right or left.
6. **ALIGN** F-Key: Used for reflections that continue beyond screen horizontally.
   a. Based on the cursor position, will shift the display horizontallly to show more of reflected pulse- the tracking cursor ends up in far left hand side.
7. **MARKER**
   a. Yields Left/Right arrow key to the Marker cursor (dotted vertical line).
      This is indicated by Line 14 < > Marker
   b. Distance from Marker to Cursor is shown in Line 13.
   c. To regain Cursor control, User can push the **CURSOR** F-key. Line 14 changes to < > Cursor.
   d. Note, Marker initally resides at the far left. Hence inital Marker reading (Line 13) = Distance Reading (Line 2)...
8. All F-keys appear in Reverse Video for more clarity.
9. User can store the waveform or recall a saved waveform by pressing the STORE/RECALL key.
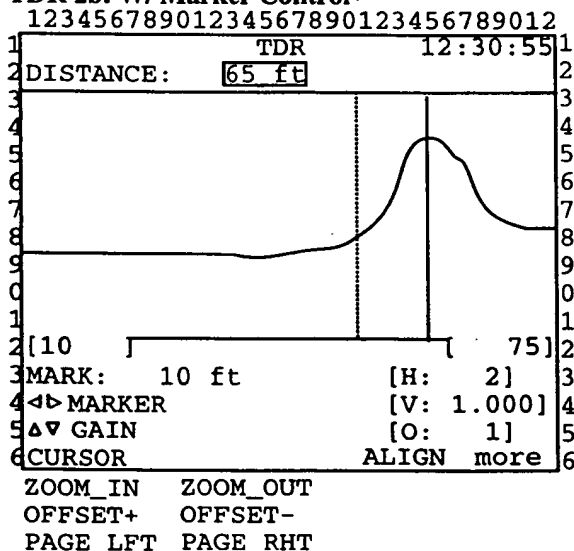
7.3.3 Insertion Loss Screens

LINE MEAS 1a:
```
 12345678901234567890123456789012
1                          12:30:55 1
2                                    2
3        LINE MEASUREMENT            3
4        MODE: MASTER                4
5                                    5
6        RESULT TYPE:                6
7                                    7
8        INSERTION LOSS              8
9        SIGNAL TO NOISE             9
0        BACKGROUND NOISE            0
1        LOOP RESISTANCE             1
2                                    2
3                                    3
4                                    4
5                                    5
6   MASTER    SLAVE                  6
 12345678901234567890123456789012
```

LINE MEAS 1b:
```
 12345678901234567890123456789012
1                          12:30:55 1
2                                    2
3        LINE MEASUREMENT            3
4        MODE: MASTER                4
5                                    5
6        RESULT TYPE:                6
7                                    7
8        INSERTION LOSS              8
9        SIGNAL TO NOISE             9
0        BACKGROUND NOISE            0
1        LOOP RESISTANCE             1
2                                    2
3                                    3
4                                    4
5                                    5
6                                    6
 12345678901234567890123456789012
```

1. When the User pushes the LINE key, the LINE MEAS 1 Screen appears.
2. The User must designate the mode:
   F1: MASTER (Measure Unit)
   F2: SLAVE (Slave Unit)
3. The User can then scroll up and down among the Result Type choices. Pressing the ENTER key takes the User to the selected measurement screen. The User can return to the LINE MEAS 1 screen by pressing the ESC key.

INSERT LOSS 1a:
```
 12345678901234567890123456789012
1                          12:30:55 1
2 >                          Idle <  2
3        INSERTION LOSS              3
4                                    4
5        ADSL DMT 256                5
6        HDSL T1 196 kHz             6
7        HDSL T1 392 kHz             7
8        HDSL E1 260 kHz             8
9        ISDN U 40 kHz               9
0        ISDN S 96 kHz               0
1        DDS 82 kHz                  1
2        T1 772 kHz                  2
3        E1 1.024 MHz                3
4                                    4
5                                    5
6                          START     6
 12345678901234567890123456789012
```

1. START F3 key or the ENTER key begins measurement by initiating the handshake between the Master set and the Slave set.

REV: A

1. Pressing the F3 START key or the ENTER key will initate the handshake between the Master unit and the Slave unit.
2. The following messages will appear in the Status Indicator at the Top/Right of the screen:
   - "**Idle**"; (PressSTART F3 Key or ENTER key), "**Connecting**"; "**Connected**"
   The Slave unit will send the tone(s) designated by the xDSL unit.
   - "**Testing**" will display on Top/Left
3. The graphical results will automatically be displayed as they become available.

INSERT LOSS 1a:

```
 1234567890123456789012345678 9012
1                        12:30:55 1
2>                           Idle< 2
3         INSERTION LOSS           3
4                                  4
5      ┌ADSL DMT 256┐              5
6       HDSL T1 196 kHz            6
7       HDSL T1 392 kHz            7
8       HDSL E1 260 kHz            8
9       ISDN U 40 kHz             9
0       ISDN S 96 kHz             0
1       DDS 82 kHz                1
2       T1 772 kHz                2
3       E1 1.024 MHz              3
4                                  4
5                                  5
6                        START     6
 123456789012345678901234567 89012
```

INSERT LOSS 1b:

```
 1234567890123456789012345678 9012
1                        12:30:55 1
2>                     Connecting< 2
3         INSERTION LOSS           3
4                                  4
5      ┌ADSL DMT 256┐              5
6       HDSL T1 196 kHz            6
7       HDSL T1 392 kHz            7
8       HDSL E1 260 kHz            8
9       ISDN U 40 kHz             9
0       ISDN S 96 kHz             0
1       DDS 82 kHz                1
2       T1 772 kHz                2
3       E1 1.024 MHz              3
4                                  4
5                                  5
6                                  6
 123456789012345678901234567 89012
```

INSERT LOSS 2a:

```
 1234567890123456789012345678 9012
1                        12:30:55 1
2>Testing              Connected< 2
3         INSERTION LOSS           3
4   Tone 125: 500 kHz : -23 dB    4
5   Tone 126: 504 kHz : -22 dB    5
6  70┐                            6
7  60┤                            7
8  50┤                            8
9-dB 40┤                          9
0  30┤                            0
1  20┤              ...           1
2  10┤        .....              2
3   0┤  .......                   3
4    1            TONE #    256    4
5                                  5
6                                  6
 123456789012345678901234567 89012
```

1. The Graphical results are displayed as soon as measurment is begun and results become available.

2. Bit Mapping used for Graph of DMT 256 Tones:
   - Horizontal Axis:
     a. 1 horizontal dot column per 2 tones (Full range displayed)
     b. 8.6 kHz/dot x 6 dots/char. = 51.6 kHz per character
     c. Both vertical dots graphed if they are at separate vertical points
   - Vertical Axis:
     a. 1 dB per dot
     b. 8 dots per character x 9 characters = 72 dB max.

SunSet xDSL
MRD-10000-001

INSERT LOSS 2b:

```
 123456789012345678901234567890 12
1                        12:30:55 1
2 >Complete            Connected< 2
3        INSERTION LOSS           3
4    Tone 192: 768 kHz : -30 dB   4
5    Tone 192: 772 kHz : -31 dB   5
6   70                            6
7   60                            7
8   50                            8
9 -dB 40                          9
0   30                            0
1   20                            1
2   10                            2
3    0                            3
4     1              256          4
5            TONE #               5
6   ◁◁    ▷▷   TABLE   RESTART     6
 123456789012345678901234567890 12
```
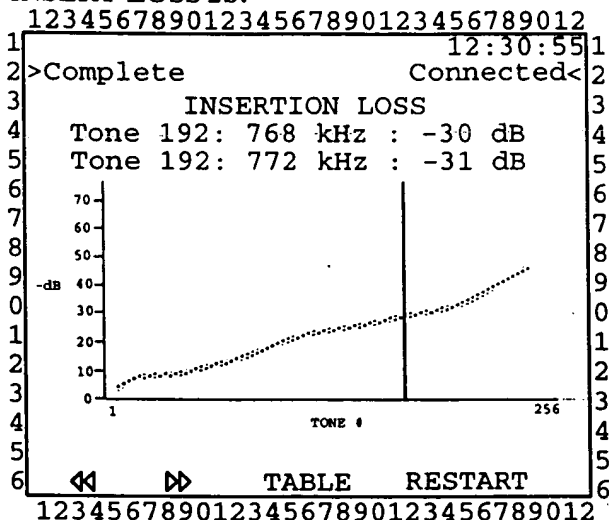
1. F-Keys are presented when all measurements are complete, as indicated by the "Complete" message on the Top/Left Status indicator.
2. Control of vertical cursor is by Left/Right Arrow keys or << F1 key and >> F2 key for fast cursor control.
   a. Corresponding measurment is displayed at top of screen
   b. It should take 3 seconds to go from left hand edge to the right hand edge.
3. F3 TABLE key leads to Tabular Results
4. F4 RESTART key restarts measurement

INSERT LOSS 3:

```
 123456789012345678901234567890 12
1                        12:30:55 1
2 >Complete            Connected< 2
3    RESULTS - INSERTION LOSS     3
4   kHz  -dB   kHz  -dB   kHz  -dB 4
5    10    5    50    5    94    7 5
6    14    6    54    6    98    7 6
7    18    5    58    5   102    6 7
8    22    6    62    6   106    7 8
9    26    5    66    5   110    8 9
0    30    6    70    6   114    8 0
1    34    5    74    5   118    7 1
2    38    6    78    6   122    8 2
3    40    5    82    5   126    8 3
4    42    6    86    6   130    8 4
5    46    5    90    5   134    9 5
6 PG-UP   PG-DN   GRAPH  RESTART  6
 123456789012345678901234567890 12
```

Tabular Results:
1. 33 frequencies displayed per pag; 8 pages total
2. F3 GRAPH key takes User back to the Graphical Results Screen
3. F4 RESTART key restarts measurement

7.3.4 Signal to Noise Screens

LINE MEAS 1:

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2                                       2
3        LINE MEASUREMENT               3
4        MODE: [MASTER]                 4
5                                       5
6        RESULT TYPE:                   6
7                                       7
8        INSERTION LOSS                 8
9        [SIGNAL TO NOISE]              9
0        BACKGROUND NOISE               0
1        LOOP RESISTANCE                1
2                                       2
3                                       3
4                                       4
5                                       5
6                                       6
 123456789012345678901234567 89012
```

S/N 1a:

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2 >                                Idle< 2
3        SIGNAL TO NOISE                3
4                                       4
5        ADSL DMT 256                   5
6        [HDSL T1 196 kHz]              6
7        HDSL T1 392 kHz                7
8        HDSL E1 260 kHz                8
9        ISDN U 40 kHz                  9
0        ISDN S 96 kHz                  0
1        DDS 82 kHz                     1
2        T1 772 kHz                     2
3        E1 1.024 MHz                   3
4                                       4
5                                       5
6                     START            6
 123456789012345678901234567 89012
```

S/N 1b:

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2 >                       Connecting<   2
3        SIGNAL TO NOISE                3
4                                       4
5        ADSL DMT 256                   5
6        [HDSL T1 196 kHz]              6
7        HDSL T1 392 kHz                7
8        HDSL E1 260 kHz                8
9        ISDN U 40 kHz                  9
0        ISDN S 96 kHz                  0
1        DDS 82 kHz                     1
2        T1 772 kHz                     2
3        E1 1.024 MHz                   3
4                                       4
5                                       5
6                                       6
 123456789012345678901234567 89012
```

S/N 2:

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2 >Complete              Connected<     2
3      RESULTS - SIGNAL TO NOISE        3
4                                       4
5      FREQUENCY : 196 kHz              5
6      SIG/NOISE :   37 dB              6
7                                       7
8                                       8
9                                       9
0                                       0
1                                       1
2                                       2
3                                       3
4                                       4
5                                       5
6                      RESTART         6
 123456789012345678901234567 89012
```

REV: A

7.3.5 Background Noise Screens

LINE MEAS 1:

```
1234567890123456789012345678 9012
1                              12:30:55 1
2                                       2
3        LINE MEASUREMENT                3
4        MODE: [MASTER]                  4
5                                        5
6        RESULT TYPE:                    6
7                                        7
8        INSERTION LOSS                  8
9        SIGNAL TO NOISE                 9
0        [BACKGROUND NOISE]              0
1        LOOP RESISTANCE                 1
2                                        2
3                                        3
4                                        4
5                                        5
6                                        6
  1234567890123456789012345678 9012
```

BG 1a:

```
1234567890123456789012345678 9012
1                              12:30:55 1
2 >                              Idle  < 2
3        BACKGROUND NOISE               3
4                                       4
5                                       5
6                                       6
7        TYPE: [DMT]                    7
8                                       8
9                                       9
0                                       0
1                                       1
2                                       2
3                                       3
4                                       4
5                                       5
6    DMT      E       F       G         6
  1234567890123456789012345678 9012
```

BG 2:

```
1234567890123456789012345678 9012
1                              12:30:55 1
2 >Complete            Connected< 2
3     DMT BACKGROUND NOISE        3
4 Tone 192: 772 kHz : -102 dBm/Hz 4
5 Tone 193: 776 kHz : -105 dBm/Hz 5
6   -70                          6
7   -80                          7
8   -90                          8
9                                9
0 dBm/Hz                         0
1  -120                          1
2  -130                          2
3  -140  1                 256   3
4          TONE #               4
5                               5
6  ◄◄    ►►    TABLE   RESTART   6
  1234567890123456789012345678 9012
```

BG 3a:

```
1234567890123456789012345678 9012.
1                              12:30:55 1
2 >Complete            Connected< 2
3     DMT BACKGROUND NOISE        3
4 kHz(dBm/Hz)  kHz(dBm/Hz)  kHz(dBm/Hz) 4
5 4.3   -140                     5
6 8.6   -120                     6
7 12.9  -100                     7
8  .      .                      8
9  .      .                      9
0  .      .                      0
1                                1
2                                2
3                                3
4                                4
5                                5
6   PG-UP  PG-DN   GRAPH  RESTART 6
  1234567890123456789012345678 9012
```

SunSet xDSL
MRD-10000-001

LINE MEAS 1:

```
  1234567890123456789012345678 9012
1 ┌─────────────────────────────────┐1
2 │                        12:30:55 │2
3 │   LINE MEASUREMENT              │3
4 │   MODE: [MASTER]                │4
5 │                                 │5
6 │   RESULT TYPE:                  │6
7 │                                 │7
8 │   INSERTION LOSS                │8
9 │   SIGNAL TO NOISE               │9
0 │   [BACKGROUND NOISE]            │0
1 │   LOOP RESISTANCE               │1
2 │                                 │2
3 │                                 │3
4 │                                 │4
5 │                                 │5
6 └─────────────────────────────────┘6
  123456789012345678901234567890 12
```

BG 1b:

```
  1234567890123456789012345678 9012
1 ┌─────────────────────────────────┐1
2 │>                         Idle < │2
3 │      BACKGROUND NOISE           │3
4 │                                 │4
5 │                                 │5
6 │                                 │6
7 │      TYPE: [E]                  │7
8 │                                 │8
9 │                                 │9
0 │                                 │0
1 │                                 │1
2 │                                 │2
3 │                                 │3
4 │                                 │4
5 │  DMT      E       F       G     │5
6 └─────────────────────────────────┘6
  123456789012345678901234567890 12
```

BG 3b

```
  1234567890123456789012345678 9012
1 ┌─────────────────────────────────┐1
2 │>Complete            Connected<  │2
3 │                                 │3
4 │   E-Filter BACKGROUND NOISE     │4
5 │                                 │5
6 │                                 │6
7 │      Noise:   -42 dBm           │7
8 │                                 │8
9 │                                 │9
0 │                                 │0
1 │                                 │1
2 │                                 │2
3 │                                 │3
4 │                                 │4
5 │                                 │5
6 └─────────────────────────────────┘6
  123456789012345678901234567890 12
```

BG 3c:

```
  1234567890123456789012345678 9012
1 ┌─────────────────────────────────┐1
2 │>Complete            Connected<  │2
3 │                                 │3
4 │   F-Filter BACKGROUND NOISE     │4
5 │                                 │5
6 │                                 │6
7 │      Noise:   -42 dBm           │7
8 │                                 │8
9 │                                 │9
0 │                                 │0
1 │                                 │1
2 │                                 │2
3 │                                 │3
4 │                                 │4
5 │                                 │5
6 └─────────────────────────────────┘6
  123456789012345678901234567890 12
```

BG 3d

```
  1234567890123456789012345678 9012
1 ┌─────────────────────────────────┐1
2 │>Complete            Connected<  │2
3 │                                 │3
4 │   G-Filter BACKGROUND NOISE     │4
5 │                                 │5
6 │                                 │6
7 │      Noise:   -42 dBm           │7
8 │                                 │8
9 │                                 │9
0 │                                 │0
1 │                                 │1
2 │                                 │2
3 │                                 │3
4 │                                 │4
5 │                                 │5
6 └─────────────────────────────────┘6
  123456789012345678901234567890 12
```

REV: A

7.3.6 Loop Resistance Screens

LINE MEAS 1:

```
1234567890123456789012345 6789012
1┌─────────────────────────12:30:55┐1
2│                                  │2
3│      LINE MEASUREMENT            │3
4│      MODE: [MASTER]              │4
5│                                  │5
6│      RESULT TYPE:                │6
7│                                  │7
8│      INSERTION LOSS              │8
9│      SIGNAL TO NOISE             │9
0│      BACKGROUND NOISE            │0
1│      [LOOP RESISTANCE]           │1
2│                                  │2
3│                                  │3
4│                                  │4
5│                                  │5
6└──────────────────────────────────┘6
  1234567890123456789012345 6789012
```

LOOP 1a:

```
1234567890123456789012345 6789012
1┌─────────────────────────12:30:55┐1
2│>              Connecting<        │2
3│                                  │3
4│      LOOP RESISTANCE             │4
5│                                  │5
6│                                  │6
7│                                  │7
8│                                  │8
9│                                  │9
0│                                  │0
1│                                  │1
2│                                  │2
3│                                  │3
4│                                  │4
5│                                  │5
6│  RESTART                         │6
 └──────────────────────────────────┘
  1234567890123456789012345 6789012
```

LOOP 1b:

```
1234567890123456789012345 6789012
1┌──────────────────────────────────┐1
2│>              Connected<          │2
3│                                  │3
4│      LOOP RESISTANCE             │4
5│                                  │5
6│         1300 Ω                   │6
7│                                  │7
8│                                  │8
9│                                  │9
0│                                  │0
1│                                  │1
2│                                  │2
3│                                  │3
4│                                  │4
5│                                  │5
6│  RESTART                         │6
 └──────────────────────────────────┘
  1234567890123456789012345 6789012
```

LOOP 1c:

```
1234567890123456789012345 6789012
1┌─────────────────────────12:30:55┐1
2│>No Response   Connecting<        │2
3│                                  │3
4│      LOOP RESISTANCE             │4
5│                                  │5
6│                                  │6
7│         WARNING:                 │7
8│      FAR END NO RESPONSE         │8
9│                                  │9
0│                                  │0
1│                                  │1
2│                                  │2
3│                                  │3
4│                                  │4
5│                                  │5
6│  RESTART                         │6
 └──────────────────────────────────┘
  1234567890123456789012345 6789012
```

1. In the LINE MEASUREMENT menu, scrolling to LOOP RESISTANCE and pressing the ENTER key brings user to the above two screens.
2. Measurement of Tip to Ring Resistance is automatic as Slave unit shorts the far end.
3. User can go back to the LINE MEASUREMENT Main Menu by pressing the ESC key.
4. User can press the RESTART F1 key to perform another measurement.
5. User can also press any functionality at any time to escape out.
6. In the case of FAR END NO RESPONSE, set displays warning message.

REV: A

7.3.7 HDSL Screens

xDSL Main Menu

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2                                       2
3          xDSL Testing                 3
4                                       4
5                                       5
6      ➞ HDSL/T1/E1                      6
7                                        7
8  .        ADSL                         8
9                                        9
0                                        0
1                                        1
2                                        2
3                                        3
4                                        4
5                                        5
6                                        6
  123456789012345678901234567 89012
```

HDSL Main Menu

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2                                       2
3          HDSL MAIN MENU               3
4                                       4
5     TEST CONFIGURATION                5
6     VIEW SPAN STATUS                  6
7     VIEW PERFORMANCE DATA             7
8     T1 BASIC MEASUREMENTS             8
9     LOOP BACK CONTROL                 9
0     HDSL SYSTEM SETTINGS              0
1                                       1
2                                       2
3                                       3
4                                       4
5                                       5
6                                       6
  123456789012345678901234567 89012
```

SunSet xDSL
MRD-10000-001

T1 HDSL:HTU-C

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2                                       2
3        HDSL TEST CONFIGURATION        3
4           MODE    : HTU-C             4
5           PAYLOAD : T1                5
6                                       6
7        T1 SETUP                       7
8           Rx LEVEL  : N/A             8
9           FRAME     : N/A             9
0           LINE CODE : N/A             0
1           Tx CLOCK  : N/A             1
2           TEST RATE : 1.544 M         2
3           PATTERN   : QRS             3
4                                       4
5                                       5
6                                       6
 123456789012345678901234567 89012
```

1. Pressing the ESC key goes to previous menu
2. F-Key Choices:
TYPE: HTU-C, HTU-R, T1
PAYLOAD: T1 (default)
T1 Setup:
 Rx LEVEL: TERM, BRIDGE, MONITOR
 FRAME: ESF, SF-D4, SLC96, UNFRAME
 LINE CODE: B8ZS, AMI, AUTO
 Tx CLOCK: INTERN, EXTERN, LOOP
 TEST RATE: 1.544M, Nx64k
 PATTERN:
  T1: QRS, 1-in-8, 3-in-24, 1111, 0000, 0101,
    2E6, 2E7, 2E9, 2E11, 2E15, 2E23

T1 HDSL:HTU-R

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2                                       2
3        HDSL TEST CONFIGURATION        3
4           MODE    : HTU-R             4
5           PAYLOAD : T1                5
6                                       6
7        T1 SETUP                       7
8           Rx LEVEL  : N/A             8
9           FRAME     : N/A             9
0           LINE CODE : N/A             0
1           Tx CLOCK  : N/A             1
2           TEST RATE : 1.544 M         2
3           PATTERN   : QRS             3
4                                       4
5                                       5
6                                       6
 123456789012345678901234567 89012
```

1. Pressing the ESC key goes to previous menu
2. **F-Key Choices:**
TYPE: HTU-C, HTU-R, T1
PAYLOAD: T1 (default)
T1 Setup:
 Rx LEVEL: TERM, BRIDGE, MONITOR
 FRAME: ESF, SF-D4, SLC96, UNFRAME
 LINE CODE: B8ZS, AMI, ATUO
 Tx CLOCK: INTERN, EXTERN, LOOP
 TEST RATE: 1.544M, Nx64k
 PATTERN:
  T1: QRS, 1-in-8, 3-in-24, 1111, 0000, 0101,
    2E6, 2E7, 2E9, 2E11, 2E15, 2E23

T1 HDSL:HTU-C

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2                                       2
3        HDSL TEST CONFIGURATION        3
4           MODE    : T1                4
5           PAYLOAD : T1                5
6                                       6
7        T1 SETUP                       7
8           Rx LEVEL  : TERM            8
9           FRAME     : ESF             9
0           LINE CODE : B8ZS            0
1           Tx CLOCK  : INTERN          1
2           TEST RATE : 1.544 M         2
3           PATTERN   : QRS             3
4                                       4
5                                       5
6                                       6
 123456789012345678901234567 89012
```

1. Pressing the ESC key goes to previous menu
2. **F-Key Choices:**
TYPE: HTU-C, HTU-R, T1
PAYLOAD: T1 (default)
T1 Setup:
 Rx LEVEL: TERM, BRIDGE, MONITOR
 FRAME: ESF, SF-D4, SLC96, UNFRAME
 LINE CODE: B8ZS, AMI, AUTO
 Tx CLOCK: INTERN, EXTERN, LOOP
 TEST RATE: 1.544M, Nx64k
 PATTERN:
  T1: QRS, 1-in-8, 3-in-24, 1111, 0000, 0101,
    2E6, 2E7, 2E9, 2E11, 2E15, 2E23

SunSet xDSL
MRD-10000-001

REV: A

HDSL Main Menu

```
              HDSL MAIN MENU        12:30:55

          TEST CONFIGURATION
          VIEW  SPAN  STATUS
          VIEW  PERFORMANCE DATA
          T1 BASIC MEASUREMENTS
          LOOP BACK CONTROL
          HDSL SYSTEM SETTINGS
```

HDSL: View Span Status 1

```
                  VIEW  SPAN  STATUS        12:30:55

                     [HTU-C]
                      HDSL 1      HDSL 2
CUR MARGIN  :          21          21
MIN MARGIN  :          21          21
MAX MARGIN  :          22          22
PULSE ATTN  :          00          00
PPM OFFSET. :          00          00
24 HR ES    :        00000       00000
24 HR UAS   :        00000       00000


     PAGE-UP    PAGE-DN
```

HDSL: View Span Status 2

```
                  VIEW  SPAN  STATUS        12:30:55

                     [HTU-R]
                      HDSL 1      HDSL 2
CUR MARGIN  :          21          21
MIN MARGIN  :          21          21
MAX MARGIN  :          22          22
PULSE ATTN  :          00          00
PPM OFFSET  :          00          00
24 HR ES    :        00000       00000
24 HR UAS   :        00000       00000


     PAGE-UP    PAGE-DN
```

HDSL: View Span Status 3

```
                  VIEW  SPAN  STATUS        12:30:55
                     DS1 STATUS

                     HTU-C        HTU-R
24HR BPV SEC:       00000        00000
24HR UAS    :       00000        00000
FRAME TYPE  : SF                 SF
CODE TYPE   : B8ZS               B8ZS




     PAGE-UP    PAGE-DN
```

HDSL: View Span Status 4

```
1234567890123456789012345678 9012
1                            12:30:55 1
2                                      2
3           VIEW SPAN STATUS           3
4           ALARMS DETECTED            4
5                                      5
6 LLOS           HDSL 1 ES             6
7 RLOS           HDSL 2 ES             7
8 LOSW1          DS1 BPV               8
9 LOSW2          LAI SEC               9
0 MARGIN L1      RAI SEC               0
1 MARGIN L2      NONE                  1
2 CHAN REV                             2
3                                      3
4                                      4
5                                      5
6   PAGE-UP    PAGE-DN                 6
1234567890123456789012345678 9012
```

1. DETECTED ALARM DISPLAYED IN REVERSE VIDEO

HDSL: View Span Status 5

```
1234567890123456789012345678 9012
1                            12:30:55 1
2                                      2
3           VIEW SPAN STATUS           3
4            ALARM HISTORY             4
5                                      5
6    TYPE         CURRENT    COUNT     6
7 DS1-HTUC LOS      OK        000      7
8 DS1-HTUR LOS     ALARM      001      8
9 LOSW HDSL 1       OK        000      9
0 LOSW HDSL 2      ALARM      005      0
1 ES HDSL 1         OK        000      1
2 ES HDSL 2         OK        000      2
3 MARGIN HDSL 1     OK        000      3
4 MARGIN HDSL 2     OK        000      4
5                                      5
6   PAGE-UP    PAGE-DN                 6
1234567890123456789012345678 9012
```

REV: A

HDSL Main Menu

```
                                    12:30:55

           HDSL MAIN MENU

     TEST CONFIGURATION
     VIEW SPAN STATUS
     VIEW PERFORMANCE DATA
     T1 BASIC MEASUREMENTS
     LOOP BACK CONTROL
     HDSL SYSTEM SETTINGS



```

HDSL Perform 1: HDSL L1

```
                                    12:30:55

              PERFORMANCE DATA
        ERROR SEC / UNAVAILABLE SEC
               [HDSL LOOP 1]
                HTU-C        HTU-R
      05:45     000/000      000/000
      06:00     000/000      000/000
      06:15     000/000      000/000
      06:30     000/000      000/000
      06:45     000/000      000/000
      07:00     000/000      000/000
      07:15     000/000      000/000
      07:30     000/000      000/000

     PAGE-UP   PAGE-DN    HDSL2    DS1
```

HDSL Perform 2: HDSL L2

```
                                    12:30:55

              PERFORMANCE DATA
        ERROR SEC / UNAVAILABLE SEC
               [HDSL LOOP 2]
                HTU-C        HTU-R
      05:45     000/000      000/000
      06:00     000/000      000/000
      06:15     000/000      000/000
      06:30     000/000      000/000
      06:45     000/000      000/000
      07:00     000/000      000/000
      07:15     000/000      000/000
      07:30     000/000      000/000

     PAGE-UP   PAGE-DN    HDSL1    DS1
```

HDSL Perform 3: DS1

```
                                    12:30:55

              PERFORMANCE DATA
        ERROR SEC / UNAVAILABLE SEC
                  [DS1]
                HTU-C        HTU-R
      05:45     000/000      000/000
      06:00     000/000      000/000
      06:15     000/000      000/000
      06:30     000/000      000/000
      06:45     000/000      000/000
      07:00     000/000      000/000
      07:15     000/000      000/000
      07:30     000/000      000/000

     PAGE-UP   PAGE-DN    HDSL1    HDSL2
```

SunSet xDSL
MRD-10000-001

REV: A

HDSL Perform 4: HDSL L1

```
1234567890123456789012345678 9012
1                          12:30:55 1
2                                    2
3    7-DAY PERFORMANCE HISTORY       3
4  ERROR SEC / UNAVAILABLE SEC       4
5       [HDSL LOOP 1]                5
6          HTU-C        HTU-C        6
7 12/02/97 00000/00000 00000/00000  7
8 12/28/97 00000/00000 00000/00000  8
9 12/29/97 00000/00000 00000/00000  9
0 12/30/97 00000/00000 00000/00000  0
1 12/31/97 00000/00000 00000/00000  1
2 01/01/98 00000/00000 00000/00000  2
3 01/02/98 00000/00000 00000/00000  3
4 CURRENT  00000/00000 00000/00000  4
5                                    5
6 PAGE-UP  PAGE-DN  HDSL2   DS1      6
1234567890123456789012345678 9012
```

HDSL Perform 5 HDSL L2

```
1234567890123456789012345678 9012
1                          12:30:55 1
2                                    2
3    7-DAY PERFORMANCE HISTORY       3
4  ERROR SEC / UNAVAILABLE SEC       4
5       [HDSL LOOP 2]                5
6          HTU-C        HTU-C        6
7 12/02/97 00000/00000 00000/00000  7
8 12/28/97 00000/00000 00000/00000  8
9 12/29/97 00000/00000 00000/00000  9
0 12/30/97 00000/00000 00000/00000  0
1 12/31/97 00000/00000 00000/00000  1
2 01/01/98 00000/00000 00000/00000  2
3 01/02/98 00000/00000 00000/00000  3
4 CURRENT  00000/00000 00000/00000  4
5                                    5
6 PAGE-UP  PAGE-DN  HDSL1   DS1      6
1234567890123456789012345678 9012
```

HDSL Perform 6: DS1

```
1234567890123456789012345678 9012
1                          12:30:55 1
2                                    2
3    7-DAY PERFORMANCE HISTORY       3
4  ERROR SEC / UNAVAILABLE SEC       4
5          [DS1]                     5
6          HTU-C        HTU-C        6
7 12/02/97 00000/00000 00000/00000  7
8 12/28/97 00000/00000 00000/00000  8
9 12/29/97 00000/00000 00000/00000  9
0 12/30/97 00000/00000 00000/00000  0
1 12/31/97 00000/00000 00000/00000  1
2 01/01/98 00000/00000 00000/00000  2
3 01/02/98 00000/00000 00000/00000  3
4 CURRENT  00000/00000 00000/00000  4
5                                    5
6 PAGE-UP  PAGE-DN  HDSL1   HDSL2    6
1234567890123456789012345678 9012
```

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

Document #: MRD-10000-001	Rev: A	Date: 98-02-28	Sheet: 34	File Name: M10000A.DOC

Form #: FRM-10027   Rev: A   Date: 98-02-28   File name:F10027

HDSL Main Menu

```
123456789012345678901234567890 12
                          12:30:55
                HDSL MAIN MENU


          TEST CONFIGURATION
          VIEW SPAN STATUS
          VIEW PERFORMANCE DATA
          T1 BASIC MEASUREMENTS
          LOOP BACK CONTROL
          HDSL SYSTEM SETTINGS



123456789012345678901234567890 12
```

HDSL LB 1

```
123456789012345678901234567890 12
                          12:30:55
            LOOPBACK CONTROL



        MODE :  LOOP-UP


        TYPE :  ESF-DL


        CODE :  HTU-C




     LOOP-UP    LOOP-DN
123456789012345678901234567890 12
```

1. F-Keys
   MODE
     F1: LOOP-UP, F2: LOOP-DN
   TYPE:
     F1: ESF-DL, F2: IN-BAND
   CODE:
     F1: HTU-C, F2: HTU-R, F3: NIU, F4: CSU

2. HTU-C LOOP BACK (per MD 6100-1)
   A regenerative loop back of the DSX-1 signal toward the networrk
3. HTU-R LOOPBACK ((per MD 6100-1)
   A regenerative loop back of the DS1 signal toward the network
4. CSU & NIU LOOPBACK
   Similar to feature found in T1 products

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

Document #: MRD-10000-001	Rev: A	Date: 98-02-28	Sheet: 35	File Name: M10000A.DOC
Form #: FRM-10027	Rev: A		Date: 98-02-28	File name:F10027

SunSet xDSL
MRD-10000-001

REV: A

HDSL Main Menu: E1 System
```
 1234567890123456789012345678901 2
1                        12:30:55 1
2                                 2
3        HDSL MAIN MENU           3
4                                 4
5 TEST CONFIGURATION              5
6 VIEW SPAN STATUS                6
7 VIEW PERFORMANCE DATA           7
8 E1 BASIC MEASUREMENTS           8
9 LOOP BACK CONTROL               9
0 HDSL SYSTEM SETTINGS            0
1                                 1
2                                 2
3                                 3
4                                 4
5                                 5
6                                 6
  12345678901234567890123456789012
```

E1 HDSL:HTU-C
```
 1234567890123456789012345678901 2
1                        12:30:55 1
2                                 2
3    HDSL TEST CONFIGURATION      3
4      MODE    : HTU-C            4
5      PAYLOAD : E1               5
6                                 6
7    E1 SETUP                     7
8      Rx LEVEL  : N/A            8
9      FRAME     : N/A            9
0      CRC-4     : N/A            0
1      LINE CODE : N/A            1
2      Tx CLOCK  : N/A            2
3      TEST RATE : 2.048 M        3
4      PATTERN     2E9            4
5                                 5
6                                 6
  12345678901234567890123456789012
```

E1 HDSL:HTU-R
```
 1234567890123456789012345678901 2
1                        12:30:55 1
2                                 2
3    HDSL TEST CONFIGURATION      3
4      MODE    : HTU-R            4
5      PAYLOAD : E1               5
6                                 6
7    E1 SETUP                     7
8      Rx LEVEL  : N/A            8
9      FRAME     : N/A            9
0      CRC-4     : N/A            0
1      LINE CODE : N/A            1
2      Tx CLOCK  : N/A            2
3      TEST RATE : 2.048 M        3
4      PATTERN     2E9            4
5                                 5
6                                 6
  12345678901234567890123456789012
```

E1 HDSL:E1
```
 1234567890123456789012345678901 2
1                        12:30:55 1
2                                 2
3    HDSL TEST CONFIGURATION      3
4      MODE    : E1               4
5      PAYLOAD : E1               5
6                                 6
7    E1 SETUP                     7
8      Rx LEVEL  : TERM           8
9      FRAME     : PCM-30         9
0      CRC-4     : YES            0
1      LINE CODE : HDB3           1
2      Tx CLOCK  : INTERN         2
3      TEST RATE : 2.048 M        3
4      PATTERN     2E9            4
5                                 5
6                                 6
  12345678901234567890123456789012
```

F-Key Choices:
TYPE: HTU-C, HTU-R, E1 ; PAYLOAD: E1 (default)
 Rx LEVEL: TERM, BRIDGE, MONITOR
 FRAME: PCM-30, PCM-31, UNFRAME
 CRC-4: YES, NO ; LINE CODE: HDB3
 Tx CLOCK: INTERN, EXTERN, LOOP
 TEST RATE: 2.048M, Nx64k
 PATTERN: 2E6, 2E7, 2E9, 2E11, 2E15, 2E23, 1111, 0000, 0101, 1-8

7.3.8 ADSL Screens

SunSet xDSL
MRD-10000-001

REV: A

Opening of a Link: Note the status messages that are presented during the opening of a link.
These messages are displayed in whatever ADSL menu the user goes to.

xDSL Main Menu

```
                              12:30:55

              xDSL Testing


              HDSL/T1/E1
            →ADSL
```

ADSL Link 1a

```
                              12:30:55
>Opening Link                        <
>Initializing                        <
                ADSL

              SETUP
              MODEM STATUS
              LINK MEASUREMENTS
              PING
```

ADSL Link 1b

```
                              12:30:55
>Opening Link                        <
>Activation Acknowledgment           <
                ADSL

              SETUP
              MODEM STATUS
              LINK MEASUREMENTS
              PING
```

ADSL Link 1c

```
                              12:30:55
>Opening Link                        <
>Transceiver training                <
                ADSL

              SETUP
              MODEM STATUS
              LINK MEASUREMENTS
              PING
```

ADSL Link 1d

```
                              12:30:55
>Opening Link                        <
>Channel Analysis                    <
                ADSL

              SETUP
              MODEM STATUS
              LINK MEASUREMENTS
              PING
```

ADSL Link 1e

```
                              12:30:55
>LINK UP                             <
>                                    <
                ADSL

              SETUP
              MODEM STATUS
              LINK MEASUREMENTS
              PING
```

REV: A

xDSL Main Menu

```
 1234567890123456789012345 6789012
1                              12:30:55 1
2                                        2
3         xDSL Testing                   3
4                                        4
5                                        5
6         HDSL/T1/E1                     6
7        →ADSL                           7
8                                        8
9                                        9
0                                        0
1                                        1
2                                        2
3                                        3
4                                        4
5                                        5
6                                        6
 123456789012345678901234 56789012
```

When the User pushes the xDSL key, the following screen appears
1. Pressing the ENTER key takes the user to the ADSL Main Menu

2. Immediately, the Opening of a Link sequence takes place.

ADSL Main Menu

```
 123456789012345678901234 56789012
1                              12:30:55 1
2>LINK UP                             < 2
3>                                    < 3
4              ADSL                     4
5                                        5
6                                        6
7    SETUP                               7
8    MODEM STATUS                        8
9    LINK MEASUREMENTS                   9
0    PING                               0
1                                        1
2                                        2
3                                        3
4                                        4
5                                        5
6                                        6
 123456789012345678901234 56789012
```

1. All ADSL screens have Lines 1 and 2: 25 characters at the left reserved for status messages.
2. Normal messages are displayed on the lines while valid.
3. Exception messages that do no fit in the two lines are displayed on their own screen with a "PRESS ENTER TO CONTINUE" message.

ATU-E SETUP 1:

```
 123456789012345678901234 56789012
1                              12:30:55 1
2>LINK UP                             < 2
3>                                    < 3
4             SETUP 1                   4
5TYPE             : ATU-R               5
6                                        6
7                                        7
8                                        8
9                                        9
0                                        0
1                                        1
2                                        2
3                                        3
4                                        4
5                                        5
6  ATU-C      ATU-R                      6
 123456789012345678901234 56789012
```

SunSet xDSL
MRD-10000-001

REV: A

ATU-C SETUP 1: Normal, Mode 1

```
 1234567890123456789012345678901 2
1                              12:30:55 1
2 >LINK UP                            < 2
3 >                                   < 3
4            SETUP 1                    4
5 TYPE             :ATU-C              5
6 PROFILE          :NORMAL            6
7 RATE ADAPT MODE  :MODE 1            7
8 FAST PLN DN RATE :1536 kbps         8
9 FAST PLN UP RATE : 384 kbps         9
0 FAST MIN DN RATE :1280 kbps         0
1 FAST MIN UP RATE :[256] kbps        1
2 INT  PLN DN RATE :   0 kbps         2
3 INT  PLN UP RATE :   0 kbps         3
4 INT  MIN DN RATE :   0 kbps         4
5 INT  MIN UP RATE :   0 kbps more   5
6   +32   -32   +512   DEFAULT        6
 1234567890123456789012345678901 2
```

Notes:
1. Set has four profiles: NORMAL, USER1, USER2, USER3
   a. Normal is viewable and editable.
      - As soon has it is edited, NORMAL is replaced by USER1
      - NORMAL always available as an F-Key
      - NORMAL is default profile after NV RAM Erase.
   b. USER 1 to 3 are editable and stored
   c. May add templates (i.e. PBELL1, AMTECH1) which act like NORMAL
      - Stored Profiles are immune to NV RAM Erase.
2. Interleaved Fields are only available if no selections made for Fast. Otherwise, defaulted to 0 kbps.

F-Keys
TYPE: ATU-C, ATU-R
PROFILE: F1: NORMAL, F2: USER1,
        F3:USER2, F4: USER3
RATE ADAPT MODE:
        MODE 1, MODE 2, MODE 3

SETUP 1 Screen Fields for MODE 1:
1) FAST PLN DN RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
2) FAST PLN UP RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
3) FAST MIN DN RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
4) FAST MIN UP RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
5) INT PLN DN RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
6) INT PLN UP RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
7) INT MIN DN RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
8) INT MIN UP RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
9) Cursoring down at line 15 moves to SETUP 2

ATU-C SETUP 2: Normal, Mode 1

```
 1234567890123456789012345678901 2
1                              12:30:55 1
2 >LINK UP                            < 2
3 >                                   < 3
4            SETUP 2                    4
5 Min Mar    DN :  1 dB      more    5
6 Min Mar    UP :  1 dB              6
7 Max Mar    DN :[31] dB             7
8 Max Mar    UP : 31 dB              8
9 Target Mar DN :  6 dB              9
0 Target Mar UP :  6 dB              0
1 Max PSD    DN : -34 dBm/Hz         1
2 Max Power  DN : 20 dBm             2
3 Max Power  UP : 20 dBm             3
4 Max Delay  DN : 20 ms              4
5 Max Delay  UP : 20 ms              5
6   MORE    LESS    NORMAL            6
 1234567890123456789012345678901 2
```

1. F-KEYS:
a. Line 5 to 10 has 0 to 31 dB range.
   F1: MORE, F2: LESS, F3: NORMAL
b. Line 11 has -34 to -52 dBm/Hz range
   F1: MORE, F2: LESS, F3: NORMAL
c. Lines 12&13 has 0 to 20 dBm range
   F1: MORE, F2: LESS, F3: NORMAL
d. Lines 14 & 15 has 0 to 255 ms range
   F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 1

Notes:
1) Min Margin must be at least 1 dB < Target Margin
2) Max Delay only applies if Interleaver Used

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ATU-C SETUP 1: Normal, Mode 2

```
     12345678901234567890123456789012
1                                    12:30:55 1
2  >LINK UP                                  < 2
3  >                                         < 3
4                 SETUP 1                       4
5  TYPE                 : ATU-C                 5
6  PROFILE              : NORMAL                6
7  RATE ADAPT MODE  : MODE 2                    7
8  FAST MAX DN RATE: 1536 kbps                  8
9  FAST MAX UP RATE:  384 kbps                  9
0  INT  MAX DN RATE: 1536 kbps                  0
1  INT  MAX UP RATE:  384 kbps                  1
2  RATIO DOWNSTREAM:  100 %                     2
3  RATIO UPSTREAM  :  100 %        more         3
4                                               4
5                                               5
6   +32    -32    +512    DEFAULT               6
     12345678901234567890123456789012
```

F-Keys
TYPE: ATU-C, ATU-R
PROFILE: **F1: NORMAL, F2: USER1, F3:USER2,
F4: USER3**
RATE ADAPT MODE: **MODE 1, MODE 2, MODE 3**

SETUP 1 Screen Fields for MODE 2:
1) FAST MAX DN RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
2) FAST MAX UP RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
3) INT MAX DN RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
4) INT MAX UP RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
5) RATIO DOWNSTREAM:
   F1:100, F2: 0
6) RATIO UPSTREAM:
   F1:100, F2: 0
7) Cursoring down at line 13 moves to SETUP 2

Notes:
1. Set has four profiles: NORMAL, USER1, USER2, USER3
   a. Normal is viewable and editable.
      - As soon has it is edited, NORMAL is replaced by USER1
      - NORMAL then becomes an F-Key option
      - NORMAL is default profile after NV RAM Erase.
   b. USER 1 to 3 are editable and stored
   c. May add templates (i.e. PBELL1, AMTECH1) which act like
      NORMAL
      - Stored Profiles are immune to NV RAM Erase.

ATU-C SETUP 2: Normal, Mode 2

```
     12345678901234567890123456789012
1                                    12:30:55 1
2  >LINK UP                                  < 2
3  >                                         < 3
4                 SETUP 2                       4
5  Min Mar    DN :  1 dB           more         5
6  Min Mar    UP :  1 dB                        6
7  Max Mar    DN : [31] dB                      7
8  Max Mar    UP : 31 dB                        8
9  Target Mar DN :  6 dB                        9
0  Target Mar UP :  6 dB                        0
1  Max PSD    DN : -34 dBm/Hz                   1
2  Max Power  DN : 20 dBm                       2
3  Max Power  UP : 20 dBm                       3
4  Max Delay  DN : 20 ms                        4
5  Max Delay  UP : 20 ms                        5
6   MORE    LESS    NORMAL                      6
     12345678901234567890123456789012
```

1. **F-KEYS:**
a. Line 5 to 10 has 0 to 31 dB range.
   F1: MORE, F2: LESS, F3: NORMAL
b. Line 11 has -34 to -52 dBm/Hz range
   F1: MORE, F2: LESS, F3: NORMAL
c. Lines 12&13 has 0 to 20 dBm range
   F1: MORE, F2: LESS, F3: NORMAL
d. Lines 14 & 15 has 0 to 255 ms range
   F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 1

Notes:
1) Min Margin must be at least 1 dB < Target Margin
2) Max Delay only applies if Interleaver Used

ATU-C SETUP 1: Normal, Mode 2

```
    123456789012345678901234567890 12
1                               12:30:55 1
2 >LINK UP                             < 2
3 >                                    < 3
4              SETUP  1                   4
5 TYPE             : ATU-C               5
6 PROFILE          : NORMAL              6
7 RATE ADAPT MODE  : MODE 2              7
8 FAST MAX DN RATE : 1536  kbps          8
9 FAST MAX UP RATE :  384  kbps          9
0 INT  MAX DN RATE : 1536  kbps          0
1 INT  MAX UP RATE :  384  kbps          1
2 RATIO DOWNSTREAM :  100 %              2
3 RATIO UPSTREAM   :  100 %    more      3
4                                        4
5                                        5
6    +32    -32    +512    DEFAULT       6
    123456789012345678901234567890 12
```

F-Keys
TYPE: ATU-C, ATU-R
PROFILE: **F1: NORMAL, F2: USER1, F3:USER2,**
F4: USER3
RATE ADAPT MODE: **MODE 1, MODE 2, MODE 3**

SETUP 1 Screen Fields for MODE 2:
1) FAST MAX DN RATE:
F1:+32, F2: -32, F3: +512, F4: DEFAULT
2) FAST MAX UP RATE:
F1:+32, F2: -32, F3: +512, F4: DEFAULT
3) INT MAX DN RATE:
F1:+32, F2: -32, F3: +512, F4: DEFAULT
4) INT MAX UP RATE:
F1:+32, F2: -32, F3: +512, F4: DEFAULT
5) RATIO DOWNSTREAM:
F1:100, F2: 0
6) RATIO UPSTREAM:
F1:100, F2: 0
7) Cursoring down at line 13 moves to SETUP 2

Notes:
1. Set has four profiles: NORMAL, USER1, USER2, USER3
a. Normal is viewable and editable.
- As soon has it is edited, NORMAL is replaced by USER1
- NORMAL then becomes an F-Key option
- NORMAL is default profile after NV RAM Erase.
b. USER 1 to 3 are editable and stored
c. May add templates (i.e. PBELL1, AMTECH1) which act like NORMAL
- Stored Profiles are immune to NV RAM Erase.

ATU-C SETUP 2: Normal, Mode 2

```
    123456789012345678901234567890 12
1                               12:30:55 1
2 >LINK UP                             < 2
3 >                                    < 3
4              SETUP  2                   4
5 Min Mar    DN :  1 dB          more    5
6 Min Mar    UP :  1 dB                   6
7 Max Mar    DN : 31 dB                   7
8 Max Mar    UP : 31 dB                   8
9 Target Mar DN :  6 dB                   9
0 Target Mar UP :  6 dB                   0
1 Max PSD     DN : -34 dBm/Hz             1
2 Max Power   DN : 20 dBm                 2
3 Max Power   UP : 20 dBm                 3
4 Max Delay   DN : 20 ms                  4
5 Max Delay   UP : 20 ms                  5
6    MORE    LESS    NORMAL               6
    123456789012345678901234567890 12
```

1. F-KEYS:
a. Line 5 to 10 has 0 to 31 dB range.
F1: MORE, F2: LESS, F3: NORMAL
b. Line 11 has -34 to -52 dBm/Hz range
F1: MORE, F2: LESS, F3: NORMAL
c. Lines 12&13 has 0 to 20 dBm range
F1: MORE, F2: LESS, F3: NORMAL
d. Lines 14 & 15 has 0 to 255 ms range
F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 1

Notes:
1) Min Margin must be at least 1 dB < Target Margin
2) Max Delay only applies if Interleaver Used

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ATU-C SETUP 1: Normal, Mode 3

```
 1234567890123456789012345678 9012
1                                   12:30:55
2 >LINK UP                                  <
3 >                                         <
4            SETUP 1
5 TYPE               : ATU-C
6 PROFILE            : NORMAL
7 RATE ADAPT MODE    : MODE 3
8 INT  MAX DN RATE: [1536] kbps
9 INT  MAX UP RATE:  384  kbps
0 FAST MAX DN RATE: 1536  kbps
1 FAST MAX UP RATE:  384  kbps
2 RATIO DOWNSTREAM:  100 %
3 RATIO UPSTREAM  :  100 %      more
4
5
6    +32    -32    +512    DEFAULT
 123456789012345678901234 56789012
```

F-Keys
TYPE: ATU-C, ATU-R
PROFILE: F1: NORMAL, F2: USER1,
        F3:USER2, F4: USER3
RATE ADAPT MODE:
        MODE 1, MODE 2, MODE 3

SETUP 1 Screen Fields for MODE 2:
1) FAST MAX DN RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
2) FAST MAX UP RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
3) INT MAX DN RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
4) INT MAX UP RATE:
   F1:+32, F2: -32, F3: +512, F4: DEFAULT
5) RATIO DOWNSTREAM:
   F1:100, F2: 0
6) RATIO UPSTREAM:
   F1:100, F2: 0
7) Cursoring down at line 13 moves to SETUP 2

ATU-C SETUP 2: Normal, Mode 3

```
 1234567890123456789012345678 9012
1                                   12:30:55
2 >LINK UP                                  <
3 >                                         <
4            SETUP 2
5 Min Mar    DN :  1 dB          more
6 Min Mar    UP :  1 dB
7 Max Mar    DN : [31] dB
8 Max Mar    UP : 31 dB
9 Target Mar DN :  6 dB
0 Target Mar UP :  6 dB
1 Max PSD    DN : -34 dBm/Hz
2 Max Power  DN : 20 dBm
3 Max Power  UP : 20 dBm
4 Max Delay  DN : 20 ms
5 Max Delay  UP : 20 ms          more
6    MORE     LESS    NORMAL
 123456789012345678901234 56789012
```

1. **F-KEYS:**
a. Line 5 to 10 has 0 to 31 dB range.
   F1: MORE, F2: LESS, F3: NORMAL
b. Line 11 has -34 to -52 dBm/Hz range
   F1: MORE, F2: LESS, F3: NORMAL
c. Lines 12&13 has 0 to 20 dBm range
   F1: MORE, F2: LESS, F3: NORMAL
d. Lines 14 & 15 has 0 to 255 ms range
   F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 1
   Cursoring down at line 15 moves to
   SETUP 3

Notes:
1) Min Margin must be at least
   1 dB < Target Margin
2) Max Delay only applies if
   Interleaver Used

ATU-C SETUP 3: Normal, Mode 3

```
 1234567890123456789012345678 9012
1                                   12:30:55
2 >LINK UP                                  <
3 >                                         <
4            SETUP 3
5 DNshift Mar   DN :  4 dB       more
6 DNshift Mar   UP :  8 dB
7 UPshift Mar   DN :  4 dB
8 UPshift Mar   UP :  8 dB
9 DNshift Intv  DN : 20 s
0 DNshift Intv  UP : 20 s
1 UPshift Intv  DN : 20 s
2 UPshift Intv  UP : 20 s        more
3
4
5
6    MORE     LESS    NORMAL
 123456789012345678901234 56789012
```

1. **F-KEYS:**
a. Line 5 to 8 has 0 to 31 dB range.
   F1: MORE, F2: LESS, F3: NORMAL
b. Line 9 to 12 has 0 to 255 s range
   F1: MORE, F2: LESS, F3: NORMAL

2. Cursoring up at line 5 moves to SETUP 2
   Cursoring down at line 12 moves to SETUP 1

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ADSL MOD STAT 1

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2>LINK UP                              <2
3>                                     <3
4           MODEM STATUS               4
5                                      5
6        ┌────────────────┐            6
7        │GENERAL  STATUS │            7
8        └────────────────┘            8
         BITS  GRAPHIC/TABLE
8        CARRIER  MASK               8
9        CLOSE  LINK                 9
0        OPEN  LINK                  0
1        ATU  MODULE  SELF  TEST     1
2                                    2
3                                    3
4                                    4
5                                    5
6                                    6
 123456789012345678901234567 89012
```

ADSL MOD STAT 2

```
 1234567890123456789012345678 9012
1                              12:30:55 1
2>LINK UP                              <2
3>                                     <3
4           GENERAL  STATUS            4
5                                      5
6    ATU-C  REV:      ATU-C  MFR:ALCT  6
7    ATU-R  REV:      ATU-R  MFR:ALCT  7
8                                      8
9 [DOWNSTREAM]        [UPSTREAM]       9
0CAPACITY:70%         CAPACITY:60%     0
1MARGIN   :  5  dBm   MARGIN   :  6  dBm 1
2POWER    :20  dBm    POWER    :20  dBm  2
3ATTEN    :45  dBm    ATTEN    :45  dBm  3
4FAST  RTE:           FAST  RTE:        4
5SLOW  RTE: 1536      SLOW  RTE: 384    5
6                                       6
 1234567890123456789012345678 9012
```

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REV: A

BITS 1

```
1234567890123456789012345678 9012
1                                    12:30:55 1
2 >LINK UP                                    2
3 >                                           3
4          BITS  GRAPHIC                      4
5          Tone 221:  6 BITS                  5
6          Tone 222:  8 BITS                  6
7                                             7
8    14                                       8
9                                             9
0                                             0
1     7                                       1
2                                             2
3     0                                       3
4     0                   256                 4
5                                             5
6     >>      <<            TABLE             6
   12345678901234567890123456789012
```

BITS 2

```
12345678901234567890123456789012
1                                    12:30:55 1
2 >LINK UP                                    2
3 >                                           3
4          BITS  TABLE                        4
5                                             5
6 # BITS   # BITS    # BITS   # BITS          6
7 0   8    8   0     16  7    24  12          7
8 1   7    9   0     17  8    25  9           8
9 2   6    10  3     18  7    26  8           9
0 3   8    11  11    19  8    27  7           0
1 4   7    12  5     20  0    28  4           1
2 5   8    13  7     21  2    29  0           2
3 6   5    14  8     22  2    30  3           3
4 7   4    15  8     23  6    31  4           4
5                                             5
6  PAGE-UP   PAGE-DN        GRAPHIC           6
  12345678901234567890123456789012
```
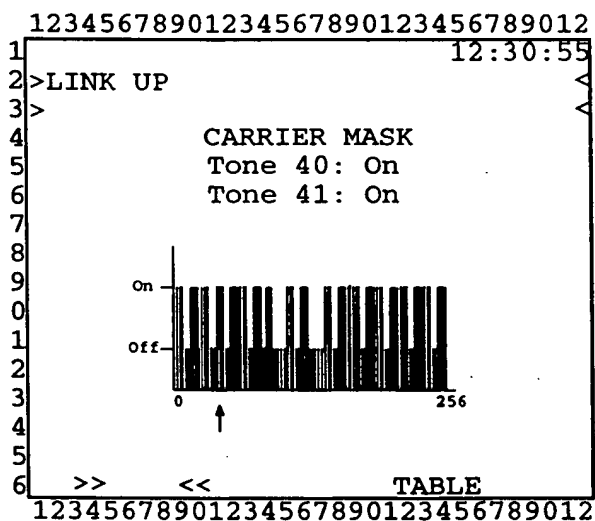
Carrier Mask 1

```
12345678901234567890123456789012
1                                    12:30:55 1
2 >LINK UP                                    2
3 >                                           3
4         CARRIER  MASK                       4
5         Tone 40: On                         5
6         Tone 41: On                         6
7                                             7
8                                             8
9    On                                       9
0                                             0
1    off                                      1
2                                             2
3    0                    256                 3
4                                             4
5                                             5
6     >>      <<            TABLE             6
   12345678901234567890123456789012
```

Carrier Mask 2

```
12345678901234567890123456789012
1                                    12:30:55 1
2 >LINK UP                                    2
3 >                                           3
4         CARRIER  MASK                       4
5                                             5
6 # STATE  # STATE   # STATE   # STATE        6
7 0  ON    8  ON     16 ON     24 ON          7
8 1  ON    9  ON     17 ON     25 ON          8
9 2  OFF   10 OFF    18 OFF    26 OFF         9
0 3  ON    11 ON     19 ON     27 ON          0
1 4  ON    12 ON     20 ON     28 ON          1
2 5  OFF   13 OFF    21 OFF    29 OFF         2
3 6  OFF   14 OFF    22 OFF    30 OFF         3
4 7  ON    15 ON     23 ON     31 ON          4
5                                             5
6  PAGE-UP   PAGE-DN        GRAPHIC           6
  12345678901234567890123456789012
```

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REV: A

ADSL MOD STAT 1

```
1234567890123456789012345678 9012
1                              12:30:55 1
2 >LINK UP                              2
3 >                                     3
4         MODEM STATUS                  4
5                                       5
6      GENERAL STATUS                   6
7      BITS GRAPHIC/TABLE               7
8      CARRIER MASK                     8
9     [CLOSE LINK]                      9
0      OPEN LINK                        0
1      ATU MODULE SELF TEST             1
2                                       2
3                                       3
4                                       4
5                                       5
6                                       6
  1234567890123456789012345678 9012
```

Close Link 1

```
1234567890123456789012345678 9012
1                              12:28:25 1
2 >LINK UP                              2
3 >                                     3
4         CLOSE LINK                    4
5                                       5
6                                       6
7   PRESS ENTER TO CLOSE LINK           7
8                                       8
9                                       9
0                                       0
1                                       1
2                                       2
3                                       3
4                                       4
5                                       5
6                                       6
  1234567890123456789012345678 9012
```

Close Link 2

```
1234567890123456789012345678 9012
1                              12:28:25 1
2 >CLOSING LINK                         2
3 >                                     3
4         CLOSE LINK                    4
5                                       5
6                                       6
7     CLOSING LINK ...                  7
8                                       8
9                                       9
0                                       0
1                                       1
2                                       2
3                                       3
4                                       4
5                                       5
6                                       6
  1234567890123456789012345678 9012
```

Close Link 3

```
1234567890123456789012345678 9012
1                              12:28:25 1
2 >LINK DOWN                           2
3 >                                    3
4         CLOSE LINK                   4
5                                      5
6                                      6
7        COMPLETE                      7
8                                      8
9                                      9
0                                      0
1                                      1
2                                      2
3                                      3
4                                      4
5                                      5
6                                      6
  1234567890123456789012345678 9012
```

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

| Document #: MRD-10000-001 | Rev: A | Date: 98-02-28 | Sheet: 45 | File Name: M10000A.DOC |

Form #: FRM-10027   Rev: A   Date: 98-02-28   File name:F10027

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REV: A

ADSL MOD STAT 1

```
 123456789012345678901234567890 12
1                              12:30:55 1
2>LINK UP                           <2
3>                                  <3
4         MODEM STATUS              4
5                                   5
6      GENERAL STATUS               6
7      BITS GRAPHIC/TABLE           7
8      CARRIER MASK                 8
9      CLOSE LINK                   9
0     [OPEN LINK]                   0
1      ATU MODULE SELF TEST         1
2                                   2
3                                   3
4                                   4
5                                   5
6                                   6
 123456789012345678901234567890 12
```

Open Link 1a

```
 123456789012345678901234567890 12
1                              12:28:25 1
2>LINK DOWN                         <2
3>                                  <3
4         OPEN LINK                 4
5                                   5
6                                   6
7   PRESS ENTER TO OPEN LINK        7
8                                   8
9                                   9
0                                   0
1                                   1
2                                   2
3                                   3
4                                   4
5                                   5
6                                   6
 123456789012345678901234567890 12
```

Open Link 1b

```
 123456789012345678901234567890 12
1                              12:30:55 1
2>LINK UP                           <2
3>                                  <3
4         OPEN LINK                 4
5                                   5
6                                   6
7      LINK ALREADY OPEN            7
8                                   8
9                                   9
0                                   0
1                                   1
2                                   2
3                                   3
4                                   4
5                                   5
6                                   6
 123456789012345678901234567890 12
```

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REV: A

ADSL MOD STAT 1

```
 1234567890123456789012345678901 2
1                          12:30:55 1
2 >LINK UP                        < 2
3 >                               < 3
4            MODEM STATUS           4
5                                   5
6         GENERAL STATUS            6
7         BITS GRAPHIC/TABLE        7
8         CARRIER MASK             8
9         CLOSE LINK               9
0         OPEN LINK                0
1         ATU MODULE SELF TEST     1
2                                   2
3                                   3
4                                   4
5                                   5
6                                   6
 123456789012345678901234567 89012
```

ATU Module - Self Test 1a

```
 1234567890123456789012345678901 2
1                          12:30:55 1
2 >SELF TEST                      < 2
3 >                               < 3
4            ATU MODULE             4
5             SELF TEST             5
6                                   6
7         TESTING...               7
8                                   8
9                                   9
0                                   0
1                                   1
2                                   2
3                                   3
4                                   4
5                                   5
6                                   6
 1234567890123456789012345678 9012
```

ATU Module - Self Test 1b

```
 1234567890123456789012345678901 2
1                          12:30:55 1
2 >SELF TEST                      < 2
3 >                               < 3
4            ATU MODULE             4
5             SELF TEST             5
6                                   6
7                                   7
8         COMPLETE                 8
9                                   9
0         NO ERRORS                0
1                                   1
2                                   2
3                                   3
4                                   4
5                                   5
6                                   6
 1234567890123456789012345678 9012
```

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ADSL Main Menu

```
 123456789012345678901234567890012
1                                   12:30:55 1
2 >LINK UP                                  < 2
3 >                                         < 3
4                ADSL                         4
5                                             5
6                                             6
7           SETUP                             7
8           MODEM STATUS                      8
9          |LINK MEASUREMENTS|                9
0           PING                              0
1                                             1
2                                             2
3                                             3
4                                             4
5                                             5
6                                             6
  123456789012345678901234567890012
```

Link Measurements 1

```
 123456789012345678901234567890012
1                          12:30:55 1
2 >LINK UP        ET: 042:30:00 < 2
3 >              RT: 005:25:25 < 3
4      LINK MEASUREMENTS 1         4
5                                  5
6    [ATU-C]          [ATU-R]      6
7 FEC INT  :       FEC INT  :_ _ _ 7
8 FECI Rate:0.0e-9 FECI Rate:_ _ _ 8
9 FEC Fast :_ _ _  FEC Fast :_ _ _ 9
0 FECF Rate:0.0e-9 FECF Rate:_ _ _ 0
1 CRC Int  :_ _ _  CRC Int  :_ _ _ 1
2 CRC IRate:0.0e-9                 2
3 CRC Fast :_ _ _  CRC Fast :_ _ _ 3
4 CRCF Rate:_ _ _  CRCF Rate:      4
5                                  5
6  PAGE-UP  PAGE-DN   RESTART      6
  123456789012345678901234567890012
```

Link Measurements 2

```
 123456789012345678901234567890012
1                          12:30:55 1
2 >LINK UP        ET: 042:30:00 < 2
3 >              RT: 005:25:25 < 3
4     LINK MEASUREMENTS 2          4
5  [ATU-C]          [ATU-R]        5
6 HECI    :       HECI    :        6
7 HECI Rate:      HECI Rate:        7
8 HEC Fast :      HEC Fast :        8
9 HECF Rate:      HECF Rate:        9
0 ES      :       ES      :         0
1 ES%     :       ES%     :         1
2 UAS     :       UAS     :         2
3 UAS%    :       UAS%    :         3
4                                  4
5                                  5
6 PAGE-UP  PAGE-DN   RESTART       6
  123456789012345678901234567890012
```

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REV: A

Status Message Screens:
Displayed until User presses F1: CONTINU, ENTER, or ESC

ADSL STATUS 1a

```
 1234567890123456789012345 6789012
1                        12:30:55 1
2>LINK DOWN                       <2
3>                                <3
4   STATUS: DOWN                   4
5   Requested Bit Rate too high    5
6   Maximum Attainable Rates:      6
7    UPSTREAM   :  192  kbps       7
8    DOWNSTREAM: 1024  kbps        8
9                                  9
0   (No lock possible)            0
1   (Protocol error)             1
2   (Message error)              2
3                                  3
4                                  4
5                                  5
6     CONTINU                      6
 1234567890123456789012345 6789012
```

ADSL STATUS 1b

```
 1234567890123456789012345 6789012
1                        12:30:55 1
2>LINK UP                         <2
3>                                <3
4   LINK STARTED                   4
5   REDUCED SPEED                  5
6                                  6
7    UPSTREAM   :  192  kbps       7
8    DOWNSTREAM: 1024  kbps        8
9                                  9
0                                  0
1                                  1
2                                  2
3                                  3
4                                  4
5                                  5
6     CONTINU                      6
 1234567890123456789012345 6789012
```

ADSL STATUS 2

```
 1234567890123456789012345 6789012
1                        12:30:55 1
2>                                <2
3>                                <3
4        MODEM STATUS              4
5                                  5
6                                  6
7        PLEASE WAIT               7
8                                  8
9        OPENING LINK ...          9
0                                  0
1                                  1
2                                  2
3                                  3
4                                  4
5                                  5
6                                  6
 1234567890123456789012345 6789012
```

If a menu function is not available during the opening of the link, then a message like the one depicted here will be displayed.

SunSet xDSL
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REV: A

Following Screens Require Further Study:

STORE/RECALL 1

```
 1234567890123456789012345678 9012
1                          12:30:55 1
2                                    2
3      MEASUREMENT STORAGE           3
4 123456789012345678901234567 89012  4
5 No. DATE-YMD TIME-HMS LABEL         5
6 CUR 97/10/31 15:23:11 BAD 96 kHz    6
7 001 97/11/30 09:30:12 OPEN          7
8 002 97/12/30 19:19:19 LOAD COIL     8
9 003 98/01/30 13:09:55 GOOD DMT      9
0                                     0
1                                     1
2                                     2
3                                     3
4                                     4
5                                     5
6  VIEW      DELETE     STORE   more  6
   LABEL     PRINT      CLR-ALL more
   RESULTS   PAGE-UP    PAGE-DN more
```

1. The User can access this Menu in any mode at any
   time by pressing the STORE/RECALL key.
   a. User can then store any measurements or recall any
      previously saved measurements.
   b. User can also initate all functions shown as F-Keys.

STORE/RECALL 3

```
 123456789012345678901234567 89012
1                         12:30:55 1
2                                   2
3     MEASUREMENT STORAGE           3
4  LABEL    :                       4
5  FILE No.:                        5
6                                   6
7                                   7
8        A B C D E F G              8
9        H I J K L M N              9
0        O P Q R S T U              0
1        V W X Y Z - /              1
2                                   2
3                                   3
4                                   4
5                                   5
6 INSERT   DELETE    TOGGLE  SELECT 6
```

OTHER SETUP Main Menu

```
 1234567890123456789012345678 9012
1                          12:30:55 1
2                                    2
3        OTHER SETUP                 3
4                                    4
5     ┌─────────────────┐            5
5     │ DEFAULT SETTINGS │           5
6     └─────────────────┘            6
6       TEST PARAMETERS              6
7       GENERAL CONFIG               7
8       ERASE NV RAM                 8
9       VERSION/OPTION               9
0                                    0
1                                    1
2                                    2
3                                    3
4                                    4
5                                    5
6                                    6
 1234567890123456789012345678 9012
```

1. The User can access the Other Setup Main
Menu at any time by pressing the OTHER key.

Note: User defined default settings should remain
permanent unless changed by User (immune to
NV RAM erase)

SunSet xDSL
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R&D to Research Feasibility of following Screens:

ADSL Main Menu

```
 1234567890123456789012345678901 2
1                               12:30:55 1
2>Link Up                              < 2
3>                                      < 3
4              ADSL                       4
5                                         5
6                                         6
7         SETUP                           7
8         MODEM  STATUS                   8
9         LINK  MEASUREMENTS              9
0         PING                            0
1                                         1
2                                         2
3                                         3
4                                         4
5                                         5
6                                         6
  1234567890123456789012345678901 2
```

ADSL PING 1

```
 12345678901234567890123456789012
1                           12:30:55 1
2>Link Up                          < 2
3>                                 < 3
4              PING                  4
5                                    5
6  MY ADDRESS   :207.105.13.7        6
7  PING ADDRESS:207.105.13.10        7
8  VPI         :1                    8
9  VCI         :                     9
0  # OF BYTES  :                     0
1  TIME OUT    :                     1
2                                    2
3                                    3
4                                    4
5                                    5
6   MORE   LESS         START        6
  12345678901234567890123456789012
```

ADSL PING 2

```
 12345678901234567890123456789012
1                           12:30:55 1
2>Link Up                          < 2
3>                                 < 3
4            PING RESULTS            4
5                                    5
6                                    6
7   REPLY FROM : 207.103.13.10       7
8   BYTE       : 32                  8
9   DELAY      : 392 ms              9
0                                    0
1                                    1
2                                    2
3                                    3
4                                    4
5                                    5
6                    REPEAT          6
  12345678901234567890123456789012
```

1. Pressing REPEAT performs PING operation again.

REV: A

8.0 Configuration and Preliminary Pricing
8.1 Cost of Material:

BASE:
MOTOUP 4M
LED
LCD
DSP
TIMS
TDR+DMM
MODM
Chassis
Panels
Manual
Memory Card
Stand
Miscellaneous

Sub Total

HDSL:
PairGain Card
Transformer (2x$5)
XC5204
DS2141A (T1/E1)
PCB
Plastic Cover (insert)

Sub Total

ADSL (*estimates*):
Alcatel Chips
Xylinx
Memory
Microcontroller
Transformer
Amplifier
PCB
Plastic Cover (insert)

Sub Total

5.2 Suggested Pricing
Base
HDSL module
ADSL module
Accessories
IP Ping

REV: A

Annex

A. Target Markets

A.1 Targeted Industries:

- RBOCs and PTTs

- CAPs

- Local Telcos and CLECs

- xDSL Modem Suppliers

A.2 Estimated Total Sales at Maturity:

B. Customer Benefits

B1. The SS xDSL enables the xDSL installation technician to be more successful in provisioning lines that will work when turned over to the customer. The set tells him how fast the line will run and how much noise margin there is. The set also provides useful diagnostic information on lines that will not support successful modem turn-up. Consequently, SS xDSL saves the technician time when installing xDSL services and enables him to meet service dates with higher accuracy

B2. The SS xDSL is an essential tool for the 2nd tier service technician to quickly identify trouble sources and take effective corrective action. The set sectionalizes problems clearly between CPE, access line, Central Office provisioning, backbone network (future consideration requiring UPI, VPI), and far end network (future consideration requiring PING). It eliminates the finger pointing between the circuit provider and the computer installer.

B3. The SS xDSL provides Layers 1, 2, and 3 Qualification for DSL lines

B4. The SS xDSL handles multiple brands of xDSL- initially ADSL and HDSL. VDSL, RADSL, and others will be supported upon market demand.

B5. The SS xDSL is a simple and convenient solution because it provides testing capability that normally requires multiple pieces of equipment.
   a. Example: Two SunSet xDSLs vs. Six separate pieces: TDR, DMM, Load Coil Detector, Wideband TIMS, xTU-R, XTU-C

C. Direct Competition and Substitutes

C.1 Key Sales Proposition:
   The SunSet xDSL offers an unparalleled solution for the installation and maintenance of xDSL lines.

C.2 Major Competitors:
   Currently, the SunSet xDSL has no direct competitors. Several vendors offer substitutes (i.e. test Layer 1 only; verify modem cards; Test Layer 3 Connectivity via an ethernet port)

C.3 Key advantages: The SS xDSL is the only field test set which can properly qualify copper lines for xDSL transmission. It is the only set that offers emulation of the actual modems and provide thorough Layer 1 assessment of xDSL transmission capability. It may have Layer 3 functionality to test the backbone network and the far end network.

C.4 Potential shortcomings: The SS xDSL does not provide certain Layer 1 tests offered by specialized cable testers. However, the SS xDSL performs the most relevant tests to accurately forecast modem performance. Furthermore, the SS xDSL verifies the actual modem performance on a pair(s), which no other test set can boast.

SunSet xDSL
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<div align="right">REV: A</div>

FEATURES	SunSet xDSL				
Physical Layer Testing					
Slave / Transponder Unit	YES	NO	NO	NO	Yes
DC & AC Volt Meter	YES	NO	NO	Yes	NO
Ohm Meter	YES	NO	NO	Yes	NO
Capacitance Meter	YES	NO	NO	NO	NO
Loop Resistance	YES	NO	NO	NO	Yes
Power Influence	YES	NO	NO	Yes	Yes
TDR	10 to 18000 ft	NO	NO	3 to 30000 ft	NO
Load Coil Detector	YES	NO	Up to 4	Up to 4	Yes
Insertion Loss : Full DMT	YES	NO	196 kHz, 392 Khz	200 Hz - 200 kHz	28 , 32, 40, 196 kHz
Signal to Noise	YES	NO	NO	NO	NO
Background Noise	YES	NO	NO	NO	NO
Impulse Noise	No	NO	NO	NO	Yes
Noise Metallic	No	NO	NO	0 to 50 dBrnc	NO
Noise to Ground	No	NO	NO	40 to 100 dBrnc	NO
Longitudinal Balance	No	NO	NO	62 to 40 dB	54 to 40 dB
Patch Cable Testing	No	Yes	NO	NO	NO
Fiber Optic Testing	No	Yes	NO	NO	NO
T1 BERT	YES	NO	Yes	NO	NO
T1 Loopback Control	YES	NO	Yes	NO	NO
Dialing	No	NO	NO	DTMF, Pulse	NO
ISDN Testing	No	NO	NO	Link, NEBE, FEBE	NO
E1 BERT	YES	NO	NO	NO	NO
E1 Loopback Control	YES	NO	NO	NO	NO
Link Layer Testing					
ATU-C Emulation	YES	NO	NO	NO	NO
ATU-R Emulation	YES	NO	NO	NO	NO
HTU-C Emulation	YES	NO	NO	NO	NO
HTU-R Emulation	YES	NO	NO	NO	NO
Generate HDSL signal on span	YES	NO	Plug-in Cards	NO	NO
Generate ADSL Traffic	YES	Yes	NO	NO	NO
Measure ADSL statistics	YES	Via Ethernet interface	NO	NO	NO
Network Layer Testing					
Ethernet Interface Required	Not Required	Required	NO	NO	NO
IP/IPX Ping	Future Consideration	Yes	NO	NO	NO
VPI, VCI Provisioning & Verification	Future Consideration	Sort of	NO	NO	NO
Ethernet Troubleshooting:	No	Yes	NO	NO	NO
NIC, Hub component check	No	Yes	NO	NO	NO
SMNP System Group Query	No	Yes	NO	NO	NO
General					
Connectors	Bantam, 3 RJ-45	Dual RJ-45		2 mm banana to clips	3-wire clips
Serial Port	RS-232C or DB 9	RS-232C			NO
Display	192 x 128 pixels			192 x 192 pixels	
Keypad	20 keys	Icon Touchscreen		24 keys	3 keys
LEDs	18 bi-color				None
Speaker	YES	NONE		30 mm diameter	None
Microphone	??	NONE		Electret	None
Battery Life	NimH (5 Hr)	NimH (2 Hr)		NimH (4 Hr)	4 AA Cells
Memory	??			1 MB	
Dimensions (cm x cm x cm)	10.5 x 6 x 27	20.5 x 10.9 x 5.4	30.5 x 30.5 x 45.7	25 x 10 x 6	10.8 x 27.3 x 6.4
Transponder	10.5 x 6 x 27	None	None	NO	9.5 x 15.7 x 4.6
Weight	1.3 kg (2.8 lbs)	0.7 kg (1.7 lb)	15 lbs	1.5 kg (3.3 lb)	2 lbs, 1lb (Trans)
Pricing	See MRD	$4195 - 10 Mb/s	$3300 Base	$6,080	
		$5495 - 10/100 Mb/s	$600 Accessories		

PROPRIETARY & CONFIDENTIAL INFORMATION OF SUNRISE TELECOM

REV: A

D. Early Opportunities

)

E. Deployment Strategies and Schedule

E.1 Emulator Prototype: Ongoing

E.2 First Prototype: December 1997
- Layer 1 Minimum Function: DMM, TDR, Insertion Loss measurements up to 25 feet for 24 AWG RJ-48 cable

E.3 First Real Prototype: 2nd Week, April 1998
- Layer 1 testing with fully functional DMM, TDR, Line Measurements (Insertion Loss, Signal to Noise, Background Noise, Loop Resistance).
- One-way communication for Master/Slave functions
- No calibration between Master/Slave; Estimated error in measurements
     - DMM: 1%
     - TDR: 1%
     - Line Measurements: 10%
- Preliminary Verification to start with this version and ongoing henceforth.

E.4 Phase 2 Complete: Good Working Prototype with Minimum features for initial market introductions: June 1998 at SuperComm
- Full Layer 1
- HDSL Prototype: HTU-R, HTU-C
- ADSL Prototype (Possible): ATU-R, ATU-C

E.6 Beta Product and Demonstrators: August 1998

E.7 Successful beta trial completion: Novemeber 1998

E.8 Shipment of units: December 1998

E.9 Subsequent Features (i.e. PING, HDSL Span Power Supply): February 1999

E.10 Phase 3 Completion (Final Verification Testing, MRD Conformance): April 1999

F. Technical Partnering